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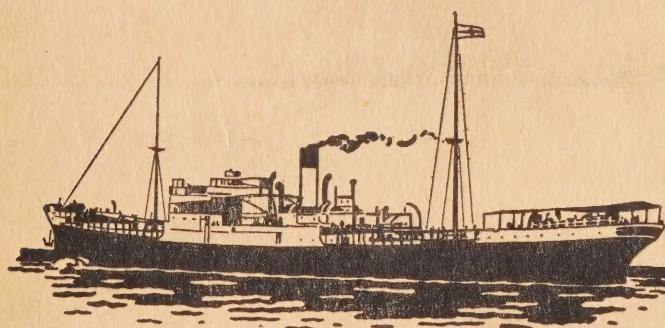
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The
**HARBOUR
of MONTREAL**

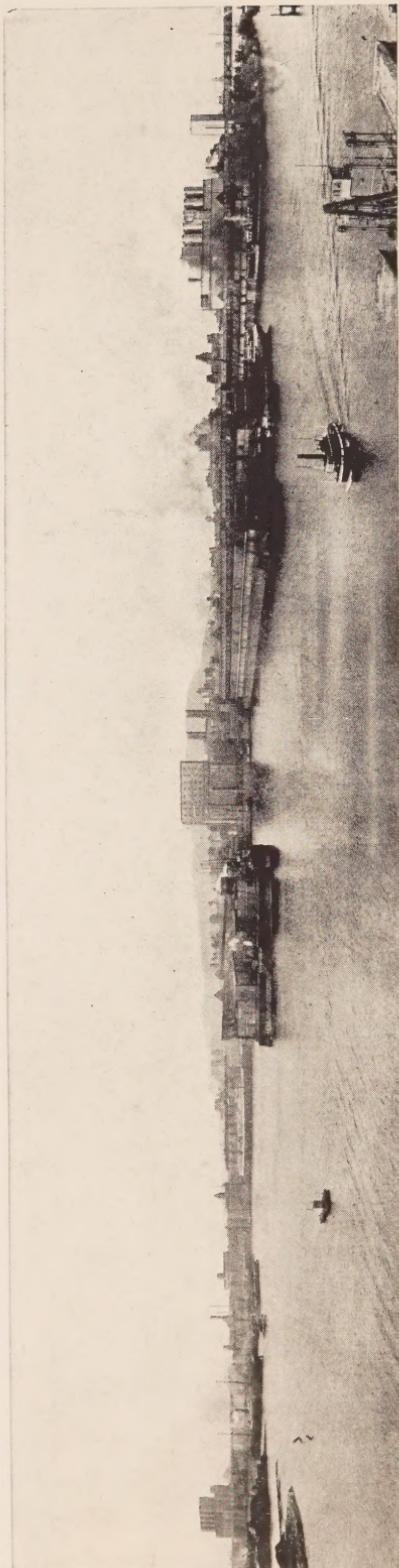


ANNUAL REPORT

1919

The St. Lawrence to-day carries to and from the Port of Montreal over one-third of the country's national trade, equivalent to something like \$800,000,000 in value during seven and a half months of the year. The Port of Montreal is, therefore, only second to New York on this continent, in point of foreign trade, and has attained that rank, although open to trade $7\frac{1}{2}$ months in the year as against twelve months of her competitors. Montreal now handles a greater volume in value of business than any port on the American continent, with the solitary exception of New York. Think of the compliment implied in that fact. Canada has less than 9,000,000 population; the United States has more than 110,000,000; and yet, with this tremendous advantage in its favour, the United States can only build up one port that handles more business than Montreal.

(*Proceedings of the American Society of Port Authorities*)



Montreal Harbour—Central Portion

The Harbour has eight miles of completed wharfage at this date, capable of accommodating one hundred vessels, as follows:—

For vessels of 500 feet in length, and drawing 30 feet of water.....	28 berths.
For vessels about 400 feet long, with draught of 25 to 30 feet of water.....	36 berths.
For vessels 300 feet long, with draught of 20 feet of water.....	17 berths.
For vessels 200 feet long, with draught of 10 feet and over.....	19 berths.
Eighteen vessels of 1,000 feet long could be berthed in the Harbour at one time.	
Twenty-three large well-lighted double-storey transit sheds, about 500 feet long by 100 feet wide, are available for goods destined for shipment.	

ANNUAL REPORT
—OF THE—
Harbour Commissioners
of Montreal
—
For the Year 1919



COMMISSIONERS:

W. G. ROSS, Esq., President

FARQUHAR ROBERTSON, Esq. Brig.-General A. E. LABELLE



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OFFICIALS

M. P. FENNELL, JR., SECRETARY-TREASURER

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F. W. COWIE, M. INST. C. E., CHIEF ENGINEER

SIR JOHN KENNEDY, CONSULTING ENGINEER

T. W. HARVIE, ASSISTANT CHIEF ENGINEER

M. PETERSON, GEN'L SUPT. OF GRAIN ELEVATORS

GEO. GENDRON, MECHANICAL SUPERINTENDENT

CAPT. T. BOURASSA, HARBOUR MASTER

CAPT. J. F. SYMONS, DEPUTY HARBOUR MASTER

GEORGE E. SMART, COMPTROLLER

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J. VAUGHAN, SUPT. OF RAILWAY TERMINALS

R. L. MERCIER, ASST. SUPT. OF RAILWAY TERMINALS

L. H. A. ARCHAMBAULT, PURCHASING AGENT

P. E. MORANT, SUPERVISOR CUSTOMS WHARFAGES

LIEUT.-COL. E. A. WILLIAMS, CHIEF OF POLICE



LIEUT.-COL. THE HON. C. C. BALLANTYNE, M.P.

MINISTER OF MARINE AND FISHERIES,
MINISTER OF NAVAL SERVICE

Harbour Commissioners of Montreal

Montreal, March 5th, 1920.

To the Hon. C. C. BALLANTYNE,
Minister of Marine and Fisheries,
Ottawa, Ont.

Sir,—

In compliance with Section 51 of the Commissioners' Act 57-8 Victoria, Chapter 48, the Harbour Commissioners of Montreal herewith respectfully submit their Annual Report of Operations for the year ended 31st December, 1919.

We have the honour to be,

Sir,

Yours very respectfully,

W. G. ROSS, President.

F. ROBERTSON,

A. E. LABELLE,

Commissioners.



U. S. Schooner in the Harbour. July 29th, 1919

Harbour Commissioners of Montreal

**ANNUAL REPORT
1919**

FOREWORD

Future of Montreal and the Harbour

The development of Montreal Harbour and the development of the City and District should be inseparable.

Montreal's position, its growth, its commerce, its industrial development and its railway termini all depend, primarily and to their present success, on Montreal Harbour.

The present Harbour of Montreal has cost Canada less than thirty million dollars. This Harbour is the second port in North and South America and the seventh in the world as to the value of foreign commerce passing through the Port.

It may be stated that no other port in the world has anything like the value existing in Montreal for the same capital cost.

It is becoming more and more recognized by Canadians that the transportation problem in Canada depends to a very large degree on the successful development of Montreal Harbour. The St. Lawrence Route via Montreal Harbour

by progressive development, can compete with any route in North America.

It stands, therefore, that if Canada would develop, Montreal Harbour must be greatly increased and enlarged.

In these days of competition with such ports as New York, Philadelphia, Baltimore and Boston, success may not depend upon imports and exports alone. The successful port of to-day requires, not only Imports and Exports, but it requires local industrial enterprise.

The handling of raw materials assembled from our own country as well as other ports of the world, the manufacture and the shipping of finished products result not only in the success of the Port, but in the success of the community.

Montreal Harbour now extends from Verdun to Bout de l'Ile, including both sides of the River St. Lawrence for a distance of about 17 miles.

The development of the Harbour must necessarily extend up and down the River, to include Radial Railway facilities and Industrial Docks at all points.

There is sufficient power within a radius of 100 miles of Montreal to develop manufacturing to such an extent as to make it one of the greatest cities in America.

To the Government and the Harbour Commissioners of Montreal, as in the past, may be left the development of the Port. In connection with the development of the Port and the development of power, industries must, for economical reasons, establish themselves in close connection with the Radial Railway Lines operating in the Port.

The development of the City, however, is an essential feature in connection with the success of this outlook.

As an illustration, it may be stated that in 1908 a delegation from Montreal Harbour visited the Port of Hamburg. At that date, in Montreal, there was a great agitation for

better transportation facilities between the centre of the City and outlying points. In Hamburg, it happened that a similar discussion was being carried on to a most intense degree. Shipbuilding, port warehousing, manufacturing and the loading and unloading of ships were all concentrated in the centre of Hamburg.

In 1914, however, what was the state of affairs and what had been accomplished? Shipbuilding, manufacturing and commercial enterprises had reached the pinnacle of success. In the six years, a tunnel had been constructed under the Elbe River for vehicles and passengers, an elevated double-track system had been constructed connecting with this tunnel and with the centre of the Harbour and City, making practically a circle to outlying points. The road called an "elevated," was partially tunnel, partially elevated and partially on the surface. In point of equipment it was equal to anything in the world at that time. For low fares employees and workmen could reach a home 7 miles from the centre of the city in 20 minutes. There, all along the line, garden homes were springing up; cottages were being built. The garden and small farmyard furnished a large part of the livelihood of the family.

Almost exactly similar to Hamburg, there are acres of ground just outside the congested areas of Montreal. With quick transportation facilities the population of Montreal Island, which is increasing in numbers, in vigour and in wealth, could be cared for, in the same manner.

One of the keynotes to success in the Harbour, in industry and in commerce is the possibility of cheap, prompt and comfortable transportation for employees and workmen to semi-supporting homes in the beautiful and healthful outlying district of Montreal.

THE HARBOUR OF MONTREAL

Special Features

First and foremost, Montreal is on the line of route, East and West, between the great Northwest of the American Continent and European Ports.

The Harbour of Montreal is at the head of ocean navigation on the St. Lawrence, and at the foot of the inland navigation of the Great Lakes.

The great transcontinental railway lines of Canada all reach ocean navigation at Montreal.

During seven months of the year, the Canadian transportation system, via the Harbour of Montreal, competes with the great lake and rail transportation system of the United States.

The financial sacrifices the Canadian people have made in order to obtain East and West transportation routes through Canada is given publicity on every hand. Equal publicity is unfortunately not given to the value of this to Canada and to the Canadian people, who earn their livelihood and gain their incomes from transportation. It is only necessary to analyse the efforts and financial resources being readily placed at the disposal of the rival transportation routes through the United States, and through United States ports, in order to fully appreciate the true value of Canadian commerce being routed through home transportation channels and Canadian ports.

The strategic position of Montreal Harbour being demonstrated, both with regard to the map and to actual recorded results, it is believed by the Harbour Commissioners of Montreal that it would be of general interest to give a brief outline of the **navigation conditions, accommodation and facilities in the Port and Harbour of Montreal.**

NAVIGATION CONDITIONS**Table of Distances**

From	To Liverpool Nautical Miles	To Rotterdam Nautical Miles
Montreal (via Belle Isle).....	2,760	3,293
do (via Cabot Straits).....	3,007	3,540
Quebec (via Belle Isle).....	2,625	3,158
do (via Cabot Straits).....	2,872	3,405
Halifax.....	2,485	2,771
St. John, N.B.....	2,692	2,978
Portland, Me.....	2,776	3,062
Boston.....	2,854	3,140
New York.....	3,036	3,322
Philadelphia.....	3,172	3,458
New Orleans.....	4,525	4,813
San Francisco (via Panama Canal).....	7,843	8,107
Vancouver (via Panama Canal).....	8,648	8,912

THE RIVER AND GULF OF ST. LAWRENCE

The distance from Belle Isle to Montreal is 873, and from Cape Race to Montreal 965 nautical miles.

Masters of magnificent British ships, who have spent their lives trading to the ports of Africa and Asia, and who have during the last two seasons been coming to Montreal for the first time, have expressed their satisfaction and even admiration regarding the River St. Lawrence Ship Channel and the Aids to Navigation. They have expressed their surprise and admiration at the facility with which their large ships can navigate up the River St. Lawrence, by night as well as by day, to the docks at Montreal, and to the fact that when they have reached their berth to have such splendid facilities afforded them.

The 35 ft. channel now being dredged by the Government between Montreal and the sea is well under way and it is expected will be available for ships in a few years. The

Harbour Commissioners have already provided several berths for vessels of this draft.

The channel, having a width of from 450 to 750 feet, well marked by range lights and lighted buoys, will provide a route safe and facile for vessels up to 20,000 tons.

The St. Lawrence route is becoming more attractive year by year. The three-day trip in calm waters, within signalling distance of the shore, is appreciated by many passengers, and the record of the regularity and safety of ships which formerly plied to distant ports in the world, but which regularly sailed to and from the St. Lawrence during the war, will aid greatly to a better knowledge of the delights, traditions and safety of the St. Lawrence route.

The table showing the draft of water in the River St. Lawrence Ship Channel to Montreal gives detailed information as to the capacity of the route for ships.

The St. Lawrence route to the Port of Montreal is therefore well worthy of the attention of Commercial and Shipping Interests in their contemplated new fields of activity.

The Honourable C. C. Ballantyne, Minister of Marine and Fisheries, who was formerly a member of the Montreal Harbour Commissioners, is taking an earnest part in the development of shipping through Canadian ports.

The interest shown in providing means of transportation, in improving and safeguarding the St. Lawrence route and in making every effort to place such information before the world, regarding the advantages and security of the route, by the Minister of Marine and Fisheries, representing the Canadian Government, is already showing excellent results. From the time ships enter the Gulf of St. Lawrence until they are safely berthed at their docks, vessels may be in constant communication with the authorities and their agents,

and every possible safeguard is provided by the Canadian Government.

THE ST. LAWRENCE ROUTE

The economic situation and facilities of the Port of Montreal was never more clearly demonstrated than during the period of the War.

The congestion of freights on the railways of America, and the shortage of cars, and the facilities in Montreal Harbour for the speedy despatch of ships prove the advantage of the St. Lawrence Route and the Port of Montreal during the critical war-time transportation period.

The Port of Montreal has not only splendid rail connections with the interior of North America, but there is the alternative route from the Great Lakes via the St. Lawrence canals, and the general lay out and construction of the Port have been carried out not only to meet these conditions but to keep the Harbour ahead of the times.

Extract from the *Scientific American* regarding the construction of the proposed new docks on Staten Island, New York Harbour.

"The proposed docks are not provided with the modern, labor saving, freight-handling equipment which is to be found in the spacious modern piers at rival ports such as Philadelphia, Montreal and Halifax, and at the leading European ports like Liverpool, London, Antwerp, and Hamburg, where intelligence, vision, and foresight have been displayed to a remarkable degree in providing up-to-date transhipping devices, railroad facilities, and means of access for motor vehicles, as well as for sorting and storing of the cargoes of modern steamers."

AVERAGE DEPTH FOR EACH MONTH IN THE 30-FOOT CHANNEL AT SOREL

(30 Feet at Extreme Low Water of 1897)

Year	May	June	July	August	September	October	November	December	High	Low
1907.....	37' 1"	35' 9"	34' 3"	32' 10"	32' 4"	32' 9"	33' 7"	38' 3"	31' 10"	31' 10"
1908.....	41' 5"	37' 10"	33' 10"	32' 10"	32' 0"	31' 0"	30' 6"	42' 4"	30' 0"	30' 0"
1909.....	40' 6"	37' 6"	33' 10"	33' 2"	32' 7"	32' 4"	31' 6"	42' 7"	30' 11"	30' 11"
1910.....	35' 7"	34' 5"	32' 3"	31' 7"	31' 6"	31' 6"	31' 7"	37' 1"	30' 7"	30' 7"
1911.....	36' 6"	34' 6"	32' 1"	31' 3"	30' 9"	30' 2"	30' 3"	38' 1"	29' 4"	29' 4"
1912.....	37' 9"	37' 6"	33' 6"	32' 8"	32' 6"	32' 6"	34' 9"	40' 11"	31' 3"	31' 3"
1913.....	37' 0"	34' 4"	32' 8"	31' 10"	31' 6"	32' 1"	32' 7"	38' 6"	31' 1"	31' 1"
1914.....	35' 2"	33' 0"	32' 4"	31' 4"	31' 3"	30' 11"	31' 0"	36' 10"	30' 3"	30' 3"
1915.....	34' 7"	32' 6"	31' 6"	31' 4"	31' 1"	30' 11"	30' 8"	37' 4"	30' 1"	30' 1"
1916.....	38' 9"	37' 2"	34' 0"	32' 5"	31' 7"	31' 9"	31' 10"	40' 0"	30' 9"	30' 9"
1917.....	36' 8"	36' 6"	34' 10"	33' 6"	32' 3"	32' 6"	33' 0"	38' 2"	31' 3"	31' 3"
1918.....	35' 1"	33' 0"	32' 10"	30' 11"	31' 4"	32' 6"	33' 10"	36' 11"	30' 3"	30' 3"
1919.....	38' 7"	35' 7"	32' 5"	31' 4"	31' 1"	31' 7"	32' 9"	39' 11"	30' 3"	30' 3"

MARINE RECORD

It is a proud record for the masters and officers of the various ships which arrived and manœuvred and departed from the Port of Montreal during the year 1918, and especially of the splendid Pilotage Service, that there was only one serious accident or marine casualty in the Port of Montreal and in the River St. Lawrence Ship Channel.

Navigation was carried on day and night more regularly than ever before. The lights and buoys and other aids to navigation and the pilotage system were beyond criticism.

Accommodation

Canada has a wonderfully cheap asset in Montreal Harbour. The total cost, \$29,500,000, is represented by:

One hundred steamship berths from 350 to 750 feet in length, with a depth of water of 20 to 35 feet.

Thirty-five of these steamship berths are at modern concrete wharves, built in the past few years.

Two large modern fireproof elevators with conveyor system to 15 steamship berths, at which 9 vessels can be loaded with grain at one time.

Twenty-three permanent fireproof transit sheds.

Fifty-eight miles of Harbour Railway Terminals.

Complete and valuable construction and repair plants.

About 200 acres of land situated in the most valuable position, industrially, in Montreal, all reclaimed.

At which other port in the world could such valuable accommodation be shown, created at such low cost?

The extent of the wharves and piers at the end of the season is as follows:—

For 30 ft. draft and over at O.L.W. 26,396 lin. ft.
or 4.9992 miles.

For 25 to 27½ ft. 13,442 lin. ft.
or 2.5458 miles. —

Total deep draft. 39,838 lin. ft.
or 7.5450 miles.

Included in this, five berths are available having a depth
of 35 feet at O.L.W.

For 20 ft. draft and under. 3,105 lin. ft.
or 0.5880 miles. —

Total wharfage, end of 1919. 42,943 lin. ft.
or 8.1330 miles.

DISTINGUISHED VISITORS TO THE PORT

During the year the Commissioners were honoured with
a visit from, among others, the following distinguished
gentlemen, all of whom were much impressed, after being
shown over the Harbour, with the magnitude of the work
entailed in the building of a great Port, and of the vital
importance of the Port's efficiency to the business of the
country:—

June 4th—Dr. J. W. Ross, Trade Commissioner to China.

June 24th—Col. Edw. Schulz, U.S. Corps of Engineers.

W. G. Bruce, Esq., President, Milwaukee
Harbour Board.

J. A. B. Thompkins, Esq., Assistant Engineer,
Milwaukee Harbour Board.

June 27th—Lord Beaverbrook.

June 30th—Mr. Epitacio Pessoa, President of Brazil.

July 9th—Sir Ashley Sparks, K.B.E., Director and Representative of the Cunard Line in U.S. and Canada.

July 28th—Right Hon. Sir Robert Borden, Prime Minister.

Aug. 5th—Roger D. Black, Esq., C. E. of New York.

Aug. 8th—C. F. Just, Esq., Canadian Trade Commissioner to Russia.

Aug. 18th—W. J. Egan, Esq., Trade Commissioner to South Africa.

Aug. 20th—Sir Charles Hobhouse, Bart.
Edward Foster, Esq., Irrigation Engineer, Egypt.

Aug. 21st—Sir William Garthwaite, Bart., of Paris, Man.-Dir. Marine Navigation Co. of Can. Ltd.

Aug. 23rd—Charles McCaffree, Esq., Industrial Commis-
sioner, S.D.

Oct. 4th—J. Reginald Rowley, Esq., Deputy Chief En-
gineer, Calcutta Harbour.

Oct. 10th—L. R. Morshead, Esq., Trafford Park Estate,
Manchester.
S. Ravenscroft, Esq., of Sanday & Co., Karachi,
India.

Oct. 31st—H.R.H. the Prince of Wales.

Nov. 18th—Gustav Henricksen, Esq., Man. Dir., Norwegian-
American Line.
Cath Bang, Esq., Chairman, Norwegian-
American Line.

Dec. 9th—Lord Jellicoe.

FINANCIAL STATEMENT

Statement of Receipts and Disbursements for the year 1919, hereto annexed, shows Receipts on Revenue Account of \$1,990,594.39, a decrease of \$113,597.09 from the previous year.

The cost of Operation, Maintenance, Interest, etc., was \$2,114,555.61, an increase over the previous year of \$88,013.54, leaving a deficit to the Debit of Revenue Account for the year of \$123,961.22. The interest charges, which amounted to \$911,320.49, show an increase of \$7,735.22 on new loans, due to the continued carrying out of works of improvement.

There was received from the Dominion Government on loan \$670,000.00 on account of Capital Expenditure for Works of Improvement, on which the Government have raised the rate of interest from $3\frac{1}{2}\%$ to 5%.

The Disbursements on Capital Account, in 1919, were \$1,176,286.30.

Capital Expenditures in 1919:—

Wharves, Piers and Basins	\$477,694.56
Permanent Sheds	320,306.36
Cold Storage Warehouse	182,258.11
Power House and Railways	143,028.70
Dredging Channels	33,152.54
New Engine House, Real Estate, etc	19,846.03
<hr/>	
Total on Capital Account	\$1,176,286.30

The Debenture Debt of the Corporation on the 31st December, 1919, was \$27,892,000.00, of which \$27,155,000.00 is due to the Government and \$737,000.00 to the public.

HARBOUR COMMISSIONERS OF MONTREAL.

Statement of Receipts and Expenditures for the Year ended 31st December, 1919.

ITEMS	TOTALS	GRAND TOTALS	ITEMS	TOTALS	GRAND TOTALS
RECEIPTS ON REVENUE ACCOUNT			DISBURSEMENTS ON REVENUE ACCOUNT		
Grain Elevator System.....	\$644,115.70		Grain Elevator System, Operation and Maintenance.	\$299,736.24	
Railway Traffic Department.....	388,885.15		Railway Traffic, Operation, Maintenance, etc.	427,696.12	
Wharfage Rates, etc.....	506,897.39		Harbour Equipment, Operation and Maintenance.....	91,500.26	
Rental of Sheds, Hoists, etc.....	272,539.57		(The above do not include Interest, Depreciation, Administration, etc.)		
Rental of Harbour Spaces.....	117,420.90		Miscellaneous and General Expenses.....	158,342.11	
Sundry Receipts on Revenue Account	60,735.68		Police Service on Wharves.....	43,500.53	
			War Service Allowance, etc.....	6,062.69	
			Sundry Disbursements on Revenue Account	126,397.17	
			Reserve Accounts for Depreciation, etc.....	50,000.00	
			Total Operation, Maintenance, etc.....	1,203,235.12	
			Interest on Debentures.....	911,320.49	
			Total Disbursements on Revenue Account.		\$2,114,555.61
			DISBURSEMENTS ON CAPITAL ACCOUNT		
			Jacques Cartier Pier Extension.....	\$230,472.32	
			Bickerdike Pier Approach.....	132,077.80	
			High Level Wharves, Sections 25 to 30	72,125.30	
			Dry Dock Area, Filling for Wharves.....	26,998.40	
			Paving Wharves, Berri to Beaudry Streets.....	11,617.33	
			Windmill Point Wharf Embankment.....	3,817.69	
			Harbour Boundaries.....	330.00	
			St. Helen's Island Wharf.....	255.72	
			Wharves, Piers and Basins, Total.....		477,694.56
			Permanent Sheds, Nos. 16 to 19; Permanent Sheds, Nos. 24 and 25	292,248.14	
				28,058.22	
			Sheds Construction, Total.....		320,306.36
			Cold Storage Warehouse.....	182,258.11	
			Power House and Electrification of Railways.....	87,031.79	
			Railway Tracks and Sidings.....	55,996.91	
			Railway Construction, Total.....		143,028.70
			Dredging Channel South of St. Helen's Island.....	29,709.00	
			Dredging Ship Channel in Harbour Altering Guard Pier	2,522.30	
				921.24	
			Dredging in Harbour, Total.....		33,152.54
			New Engine House, Harbour Yard.....		9,367.99
			Real Estate, Hoechelaga, etc.....		7,478.04
			Grain Elevator Conveyor System		3,000.00
			Total Disbursements on Capital Account.		1,176,286.33
			Grand Total Disbursements		3,290,341.91
			Balance at 31st December, 1919;		
			Bank of Montreal and Cash on Hand.....		
			Accounts Receivable		
			Material in Stock at 31st December, 1919		
					346,521.87
			Total Balance at 31st December, 1919		833,294.18
			Balance at 31st December, 1918		1,252,385.65
			Difference in Balance, to Deduct		419,091.47
					\$2,871,750.44

Certified:

Verified:

Verified:

Certified:

certified:



"London's Busy Highway"

PRINCIPAL PORTS OF THE WORLD

The table on the two following pages is taken from the Statistical Abstract of the United States Department of Commerce, issued early in 1919.

Few Canadians appreciate the fact that in point of view of value of imports and exports, the Port of Montreal occupies the seventh position among the principal ports of the world, the order as taken from this table is as follows:—

- 1st—New York.
- 2nd—Liverpool.
- 3rd—London.
- 4th—Hamburg (record of 1913).
- 5th—Antwerp (record of 1912.)
- 6th—Marseilles (record of 1915).
- 7th—Montreal.

With respect to the value of exports alone, Montreal ranks sixth among the ports of the world.

Such evidence is the justification of the Harbour Commissioners of Montreal in urging the continued development of the Port of Montreal since on a capital expenditure of some \$29,500,000, the principal Canadian national port has reached such a place in the commercial statistics of the principal ports of the world.

PRINCIPAL PORTS OF THE WORLD

Foreign Commerce during the latest year for which data
are available.

(Source: Official Reports of the respective countries.)

Country and Port	Year	Imports	Exports	Total Commerce
Europe				
United Kingdom:		Dollars	Dollars	Dollars
London.....	1917	1,643,434,000	818,045,000	2,461,479,000
Liverpool.....	1917	1,813,488,000	1,091,743,000	2,905,231,000
Hull.....	1917	277,983,000	129,152,000	407,135,000
Manchester.....	1917	280,951,000	150,250,000	431,201,000
Glasgow.....	1917	196,329,000	178,652,000	375,081,000
Southampton.....	1917	90,215,000	28,136,000	118,351,000
Grimsby.....	1917	59,185,000	15,863,000	75,048,000
Harwich.....	1917	13,241,000	1,744,000	14,985,000
Tyne Ports.....	1917	61,573,000	70,595,000	132,168,000
Cardiff.....	1917	53,802,000	101,106,000	154,908,000
Leith.....	1917	64,084,000	27,817,000	91,901,000
Bristol.....	1917	155,669,000	10,520,000	166,189,000
Belfast.....	1917	52,817,000	276,000	53,093,000
Germany:				
Hamburg.....	1913	1,084,325,000	817,275,000	1,901,600,000
Bremen.....	1913	370,608,000	211,421,000	582,029,000
Belgium:				
Antwerp.....	1912	623,164,000	588,181,000	1,211,345,000
France:				
Marseilles.....	1915	518,756,000	304,290,000	823,046,000
Havre.....	1915	441,718,000	99,902,000	541,620,000
Dunkirk.....	1915	41,865,000	8,465,000	51,320,000
Bordeaux.....	1915	298,189,000	132,534,000	430,723,000
Italy:				
Genoa.....	1915	387,600,000	120,934,000	508,534,000
Naples.....	1915	90,945,000	31,768,000	122,713,000
Turkey:				
Constantinople.....	1912	74,360,000	28,600,000	102,960,000
Austria-Hungary:				
Trieste.....	1913	175,997,000	161,430,000	337,428,000
Fiume.....	1912	43,833,000	53,923,000	97,756,000
Russia:				
Petrograd.....	1915	14,575,000	16,481,000	31,416,000
Riga.....	1915	463,500	103,000	566,500
Odessa.....	1915	721,000	51,500	772,500
Vindau.....	1914	4,061,000	27,852,000	31,913,000
Reval.....	1915	1,700,000	1,494,000	3,194,000
Libau.....	1914	15,703,000	10,590,000	26,293,000
Novorossisk.....	1914	9,573,000	35,858,000	45,431,000
Nikolaiev.....	1914	873,000	18,442,000	19,315,000
Rostov.....	1914	424,000	30,749,000	31,173,000
Kerson.....	1914	39,000	8,728,000	8,767,000
Batum.....	1914	4,469,000	14,593,000	19,062,000
Vladivostok.....	1914	26,481,000	1,752,000	28,233,000
Spain:				
Barcelona.....	1916	101,555,000	56,845,000	158,400,000
Valencia.....	1916	11,693,000	23,730,000	35,423,000
Bilbao.....	1916	21,070,000	10,788,000	31,858,000

PRINCIPAL PORTS OF THE WORLD—Continued

Country and Port	Year	Imports	Exports	Total Commerce
America				
United States:		Dollars	Dollars	Dollars
New York.....	1918	1,251,386,000	2,613,049,000	3,864,435,000
Galveston.....	1918	15,577,000	194,578,000	210,155,000
New Orleans.....	1918	117,418,000	381,330,000	498,748,000
Massachusetts.....	1918	248,927,000	205,132,000	454,059,000
Philadelphia.....	1918	101,527,000	442,223,000	543,750,000
Maryland.....	1918	29,156,000	336,079,000	365,235,000
San Francisco.....	1918	269,107,000	211,671,000	480,778,000
Washington.....	1918	326,981,000	258,006,000	584,987,000
Virginia.....	1918	23,314,000	129,311,000	152,625,000
Buffalo.....	1918	108,870,000	187,137,000	296,007,000
Michigan.....	1918	56,948,000	263,561,000	320,509,000
St. Lawrence.....	1918	92,358,000	99,865,000	192,223,000
Canada:				
Montreal.....	1918	204,818,000	524,365,000	729,183,000
Mexico:				
Vera Cruz.....	1913	40,733,000	42,118,000	82,851,000
Tampico.....	1913	22,825,000	40,379,000	63,204,000
Cuba:				
Habana.....	1917	198,908,000	83,255,000	282,163,000
Argentina:				
Buenos Aires.....	1917	145,838,000	308,940,000	454,778,000
Brazil:				
Santos.....	1917	58,970,000	107,958,000	166,928,000
Rio de Janeiro.....	1917	94,324,000	68,965,000	163,289,000
Chile:				
Valparaiso.....	1917	67,683,000	26,855,000	94,538,000
Iquique.....	1917	9,425,000	45,317,000	54,742,000
Antofagasta.....	1917	19,602,000	48,653,000	68,255,000
Peru:				
Callao.....	1917	47,504,000	36,210,000	83,714,000
Uruguay:				
Montevideo.....	1915	29,844,000	67,790,000	97,634,000
Asia				
China:				
Shanghai.....	1917	213,994,000	201,025,000	415,019,000
Canton.....	1917	28,393,000	50,924,000	79,317,000
Tientsin.....	1917	54,507,000	17,699,000	72,206,000
Japan:				
Yokohama.....	1917	143,059,000	332,198,000	475,257,000
Kobe.....	1917	264,403,000	238,926,000	503,329,000
Osaka.....	1917	46,634,000	127,148,000	173,782,000
British Colonies:				
Singapore.....	1916	244,589,000	214,600,000	459,189,000
Calcutta.....	1917	181,953,000	299,355,000	481,308,000
Bombay.....	1917	179,452,000	219,211,000	398,663,000
Africa				
Egypt:				
Alexandria.....	1916	106,109,000	178,086,000	284,195,000
Oceania				
Australia:				
Sydney.....	1917	154,647,000	239,915,000	394,562,000
Melbourne.....	1917	123,390,000	86,800,000	210,190,000

FUTURE TRADE WITH CENTRAL EUROPEAN PORTS

One of the pioneer explorers in America prefaced his report in the following terms:—

“No natural sign is more certain or more plainly visible of the prosperity and vigour of a country than the never-fading spirit of discovery which may be regarded at all times as the spirit of success.

“By this spirit is meant never-failing zeal towards the encouragement of industry and the spread of commerce and of navigation.”

If Canadian commerce and navigation would derive the proper share due to the vigour of the Canadian people and to the resources of Canadian trade, relations between Canadian ports and the ports closed to us during the War, should immediately be re-opened.

The late James Thom, Manager, the White Star-Dominion Line in Canada, frequently made the statement that great gain would result to Canada and to Canadian transportation interests by developing trade with Central Europe.

Shortly before the opening of the Great War, in 1914, the Montreal Harbour Commissioners' delegation inspected the port of Hamburg, accompanied by the Canadian Trade Commissioner, Mr. C. F. Just. The opportunities for the interchange of trade between the ports of Hamburg and Montreal were visibly apparent.

Recent reports of Hamburg indicate conditions most opportune for the acquisition of shipping and trading facilities. The Hamburg State authority are out to get business for and to revive the port at all cost, and they will, no doubt, give every facility and accommodation to any well supported effort from outside.

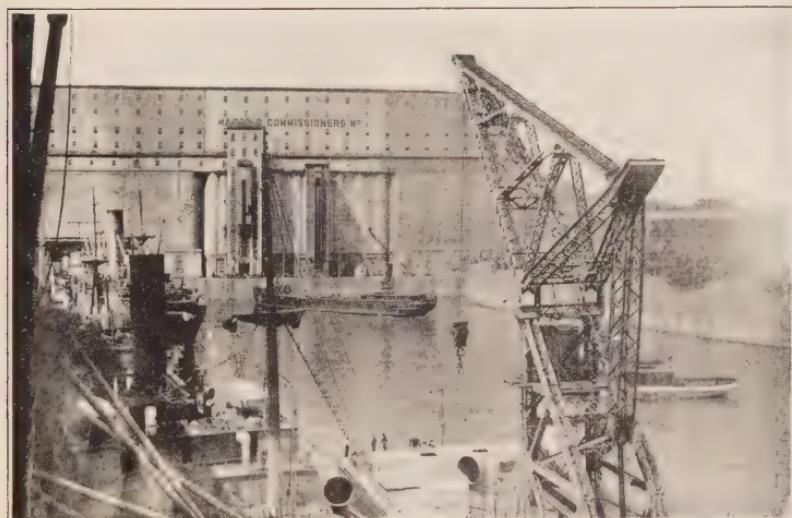
EXPENDITURE ON HARBOUR IMPROVEMENTS

At the commencement of the year 1919 the Harbour Commissioners held several conferences with the Honourable C. C. Ballantyne, Minister of Marine and Fisheries, and placed before the Government a programme of construction works for the year.

The Government requested that the programme of works be curtailed to the minimum in view of the financial situation, and finally a programme was authorized for the season's work, with the request that only such expenditure should be made as was found to be urgently necessary.

The amount authorized by the Government was \$1,750,000.

Substantial progress was made in several urgent construction items and the Commissioners were able to comply with the desire of the Government by completing the year with an expenditure on Capital Account well within the amount authorized.



Harbour Commissioners' Elevator No. 1

FACILITIES

Grain.

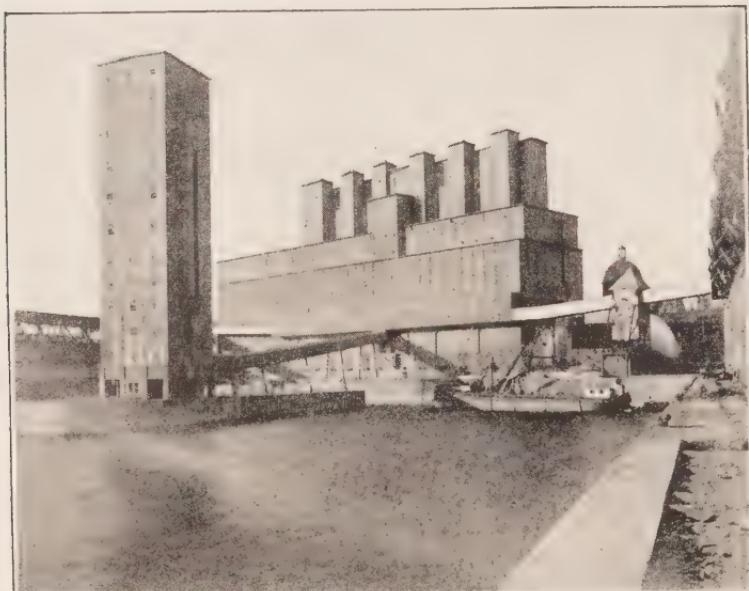
Montreal Harbour has special equipment and facilities for the storage and shipping of grain.

Three large modern fireproof elevators, having a combined storage capacity of 8,812,000 bushels, are situated in the most advantageous positions in the Harbour.

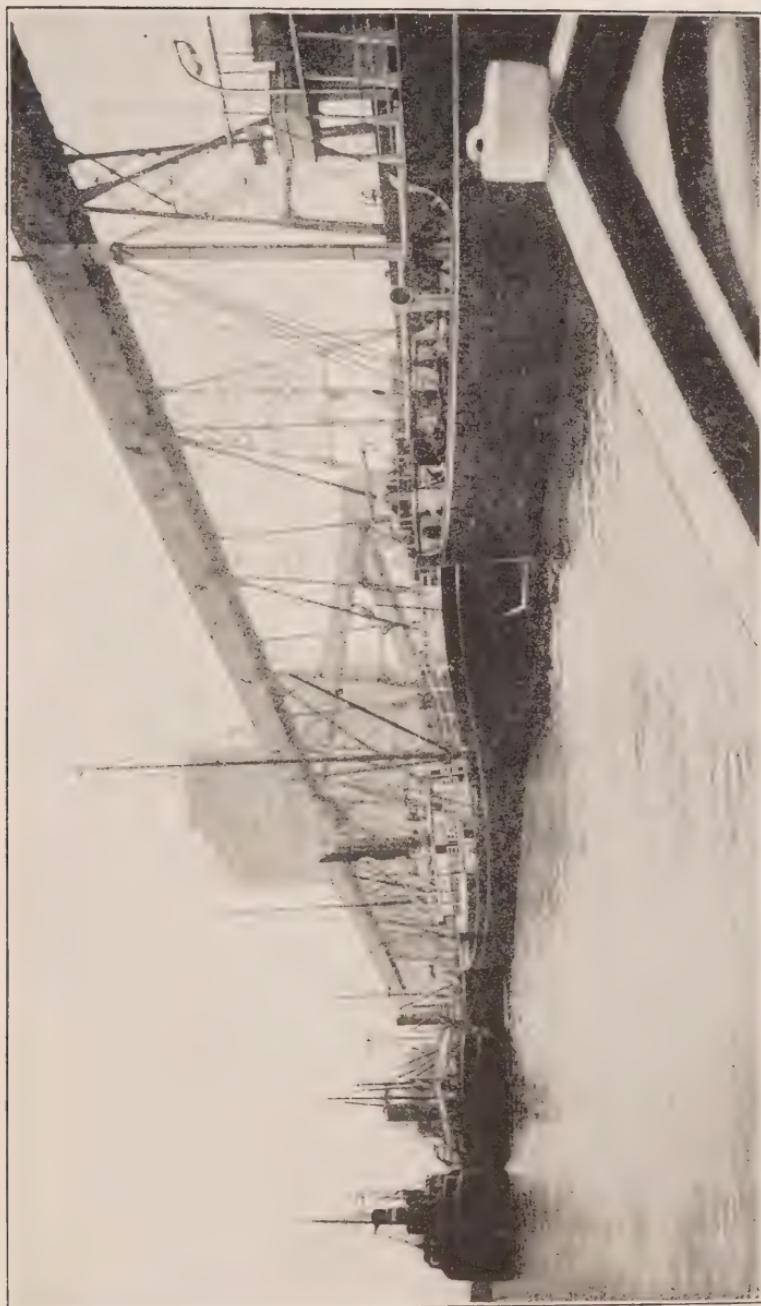
Grain grown in the West is shipped to Montreal, either by water from the head of the Lakes, directly, or by Lake and Rail routes.

Grain from the elevators may be delivered to vessels at their berths. Eleven different ships may receive grain at the same time, each at the rate of 15,000 bushels per hour.

It is recognized that the Port of Montreal is unique as an ocean port in grain handling facilities.



Harbour Commissioners' Grain Elevator No. 2



Ocean Grain Vessels, loading and waiting for berths, opposite Grand Trunk Elevator, Windmill Point

THE OIL INDUSTRY

Probably no other phase in the industrial and shipping development in connection with the Port of Montreal can compare with the successful progress of the oil industry.

In former years, when lighting and lubricating oils were important matters of commerce and transportation, shipments were made by the barrel or package.

The rapid development of gasoline requirements and of the requirements for fuel oil revolutionized former methods of storage and handling.

Tank steamers and tank cars of the largest possible capacity were used in an attempt to meet the demands for gasoline, fuel oil and other products.

Shell Company of Canada, Limited.

The Shell Company of Canada, Ltd., was the first oil company to establish a marine and rail plant for the storage and refining of oil products, connecting with the Harbour of Montreal. The plant is adjoining the Racine Wharf, Section 62, and was commenced in 1911.

This plant covers an area of 165,000 square feet with a storage capacity of approximately 18,000 tons, contained in 11 tanks varying in size from 95 feet 6 inches in diameter by 30 feet high down to tanks of 10 feet by 10 feet. These smaller tanks, of which there are five, are used for local business principally.

The whole of these tanks are situated inside a concrete enclosure 8 feet high and 18 inches thick which would, in case of accident to any or all of the tanks, take care of all the oil and prevent it from escaping to the river or any other position where there would be danger of serious consequences in case of fire.

The plant has a receiving capacity of 30 tank cars, or approximately 1,000 tons, in about 6 working hours.

Leading to the adjoining Racine Pier there are two 6" and one 8" pipe lines, connecting with the storage tanks, which enables the receiving of two cargoes of different natures at one time.

Asphalt & Supply Company, Limited.

The Asphalt & Supply Co., Ltd., have a plant located on Harbour property, just below the Tarte Pier, opposite Nicolet Street.

This plant consists of two storage tanks of 37,500 barrels capacity each; one delivery tank of 1,200 barrels capacity; a steam still, mixing tank and metal boiler and pumping house. The boilers are oil-fired.

The plant is equipped with modern automatic barreling facilities, as well as with a complete circulating pipe line system. The receiving, loading and shipping facilities are excellent.

This plant was the first to receive oil by tank vessels in the Harbour of Montreal, the first cargo being delivered by deep sea marine oil tanker S.S. "San Urbano" in May, 1915. This tanker loaded at Tuxpan, Mexico, making the trip to the Port of Montreal in thirteen days, discharging its cargo of some 55,000 barrels of Fluxphalte, a 12° Beaume road oil, in sixteen hours.

This Company have under consideration an extension of their plant, if a favourable location can be supplied.

Imperial Oil, Limited.

In 1915 the Queen City Oil Co., Ltd. (now the Imperial Oil, Limited), made application to the Harbour Commissioners for the construction of a wharf suitable to their requirements. This Company had obtained a lot of land fronting on the Harbour and had in view the establishment of a large storage and refining plant.

The wharf applied for had in view light draft vessels. The Commissioners, however, insisted upon building a standard Montreal Harbour wharf, and after a satisfactory agreement had been made, the construction of the wharf was commenced in September, 1915.

The work was finished in July, 1916, and the first steamer to dock, the S.S. "Imperoyal," discharged a cargo on 29th July, 1916.

The Harbour Commissioners' bulkhead line railway was extended to reach this wharf in 1918, and at the present time the dock and railway accommodation in connection with the Imperial Oil works are most satisfactory.

The works are situated at Section 101, Montreal Harbour, about 9 miles from the foot of Lachine Canal.

The operations of the Imperial Oil, Limited, in the Port of Montreal for one year, as given by the company, are as follows:—

The number of tank steamers discharged was.....	59.
The largest number in one month was.....	18.
Average time at pier discharging.....	14 hours.
Total quantity discharged, 2,071,703 barrels or 334,145 tons.	
Tank car receipts were 139,897 barrels or 22,565 tons.	
Making the total receipts 2,211,600 barrels or 356,710 tons	
for the year.	

Steamers loaded at Montreal Refinery for one year	118.
Largest number any one month	28.

The products shipped during 1919 amount to the following totals:—

Motor gasoline	410,254 bbls.
Royalite	171,091 "
Fuel and gas oils	706,073 "
Naphtha	4,062 "
	—————
	1,291,480 "
Imperial Heavy Flux and liquid asphalt	117,391 "
Paving asphalts, etc.	18,583 "

The situation of the Imperial Oil works adjoining the Harbour of Montreal, having excellent marine and rail connections, is most advantageous.

All ships of the St. Lawrence navigation may dock to receive fuel oil or cargoes as desired at the Harbour Commissioners' wharf constructed for this company.

Railway shipments, such as gasoline, etc., are shipped direct from the Company's works over the Harbour Commissioners' lines to the various railway companies in tank cars.

The bulk of crude petroleum comes in ships from Mexico and the United States and is pumped from ships to the Company's storage tanks over the Harbour Commissioners' docks.

After various processes of distillation have taken place the fuel oil is pumped back over the docks to outgoing ships.

The Company have in all 250 steel tanks, with a capacity of from 1,000 to 80,000 barrels. The total storage capacity is as follows:—

Crude tanks.....	873,649 bbls. or 140,842 tons.
Royalite tanks.....	71,299 " or 9,942 "
Fuel oil tanks.....	238,744 " or 39,011 "
Gasoline tanks.....	74,926 " or 9,733 "

The use of fuel oil industrially is illustrated by the fact that in 1919 a 64,000 barrel tank was erected at the St. Lawrence Sugar Refinery in Montreal, adjoining the Harbour Docks and Railways, for the storage of heavy Mexican fuel oil to be used in place of coal. The latest reports are to the effect that the St. Lawrence Sugar Refinery are having good success with this fuel oil.

The successful and rapid expansion of the oil business in Montreal is an example of the advantages resulting from industries situated on the strategically valuable Harbour front of Montreal.

The operation of the Harbour Commissioners' Railway Terminals extending along the Harbour front is prompt and economical. The receipt and delivery of materials and products over the Harbour lines offers such a saving and such an advantage to manufacturing establishments that the growth and success of some of the largest and most recent industries of Montreal are due to a large extent to their location adjoining the Harbour.

The Commissioners, in the interests of the Harbour, offer aid in the way of industrial wharves, railway yards and sidings to all large establishments having locations connecting with the Harbour terminals and having in view sufficient business.

The facilities are undertaken at the capital cost of the Harbour, upon guarantee of sufficient wharfage returns to meet the annual charges.

PACKERS' PRODUCTS

For the last two or three years the available refrigerated space on vessels on the Atlantic route has been to a large extent devoted to shipments of frozen beef, cheese, etc., so that all exporters of provisions had to be content with the coolest space to be obtained for their shipments of hams, bacon, lard, etc.

The Chicago packers have greatly favoured shipments in summer via the St. Lawrence route and the Port of Montreal, owing to the fact that their refrigerated cars are returned much more promptly, and also owing to the north and cooler route and the very short crossing of the Gulf Stream.

One large shipping firm from Chicago wrote to the Commissioners as follows:—

"I am very glad to be able to say that all our shipments of provisions via Montreal have been handled very satisfactorily. There has been practically no delay at the seaboard and contents of cars have been placed on board of steamer just about as fast as cars have arrived, and if Montreal continues to give such good service for the rest of the season we shall be delighted."

The same Company wrote regarding provision orders, that they had asked the authorities the privilege of shipping July and August contracts by way of Montreal rather than by any of the United States ports.

The shipments of packing house products through the Port of Montreal are increasing very rapidly and rank, for export, next to grain and flour.

The large, well ventilated double storey cool Transit Sheds are very favourable for unloading cars promptly and delivering to ships as required with a minimum of trucking.

PUBLIC WAREHOUSE AND COLD STORAGE PLANT

The Harbour Commissioners have recommended, for several years past, the construction "in a favourable location in Montreal Harbour" of a public fireproof Warehouse and Cold Store, to be administered and operated in the same way as the public grain elevators, which have resulted so successfully in the development of transportation and trade via Canadian Railways and the St. Lawrence route.

1. Public Warehouse.

Importers located at many centres in Canada represented to the Harbour Commissioners the fact that stocks which they would desire to import, when prices are favourable and ocean transportation possible, is not practicable to them on account of the fact that there is not available in Montreal Harbour a Public Bonded Warehouse.

Another feature is the necessity of making provision for the storage of imports not removed during the allotted period and which obstruct business in the Harbour Commissioners' Transit Sheds.

The final requirement is warehouse provision for Canadian-manufactured goods which may be shipped from factories at interior points to the Harbour of Montreal, and held until transportation conditions and a market abroad are favourable.

2. Public Cold Storage Facilities.

The design of facilities proposed in connection with this warehouse and cold storage plant has in view three features:—

a. Economy.—By erecting this warehouse on the Harbour, directly connecting with railway and with ship, the handling

charges may be greatly reduced. By constructing a modern reinforced concrete building, fully protected, rates of insurance will also be very greatly reduced.

b. Temperatures.—The plant is to be designed with the most modern, up-to-date methods of securing the required temperatures and protection for perishable goods.

c. Shippers from interior points and the West will have the assurance that their goods will be properly protected in the Port of Montreal, while waiting for ships or transportation.

Details of Design.

The site decided on by the Harbour Commissioners for the warehouse is immediately inside the Harbour retaining wall on the west side of the foot of Beaudry Street; and for the Power House, which will contain the mechanical refrigerating equipment in addition to the electrical equipment for the operation of the Harbour Electric Railways, the site is in a similar position on the east side of Beaudry Street.

Although the cubic capacity of the warehouse will be somewhat less than that of some of the recently constructed cold storage warehouses in the United States and Europe, yet, in some respects, it is claimed that it will contain certain improvements and technical features which are not to be found in any other cold storage plant.

The building, when completed, will be of an irregular, rectangular shape, fronting the River St. Lawrence, the outside average dimensions of which will be 436 feet by 103 feet. There will be eight floors and a basement, the level of the basement will be 3 ft. 6 ins. above the level of the wharf and that of the first floor will be 3 ft. 4 ins. above the level of the High Level Harbour railway tracks. Sym-

metrically along the building, above the roof, will be four towers which will contain four water tanks, three of which will be used only for the automatic sprinkler service and the fourth for the domestic supply of the building.

The building, as finally designed, will be a most handsome structure, and will add considerably to the appearance of the City of Montreal, as seen from the river. The whole of the interior of the building, i.e., the floors, their supporting columns and their foundations will be built of reinforced concrete, the floors being supported entirely independent of the surrounding walls. The walls will be constructed of reinforced concrete framework and pilasters with brick and hollow-tile filling, the brick selected being of a medium buff color. The building, as a whole, will be as fireproof as modern science and engineering can make it.

It is proposed to insulate and refrigerate only four floors at first, but an additional two floors have been so designed that the insulation and refrigeration can be extended to them with a minimum amount of expense and inconvenience. It is more than probable that a certain amount of refrigeration may be required on the first floor, if the proposal to rent individual stores to wholesale firms for the purpose of ships' trade is adopted. At first, however, it is only expected that the fourth, fifth, sixth and seventh floors will be used for cold storage purposes, and the remaining space for "dry" or general storage, not requiring insulation or refrigeration.

The warehouse will be equipped with eight large freight elevators, each capable of serving all the floors, and four of them will also serve the basement. In addition to the freight elevators, there will be one small passenger elevator which will serve all the floors.

Each cold storage floor will be divided into nine rooms, these varying in capacity from 77,750 cubic feet to 35,750 cubic feet, all opening on to a wide, spacious, well-lighted distributing corridor, the nine elevators also opening on to this corridor. Each floor will also be equipped with a scientifically designed air-conditioning plant, which will be used solely for the ventilation and purification of the air in each of the cold rooms on its floor, as and when required. The proper ventilation and purification of the air in most cold storage plants is not provided, to the detriment of the goods stored, and it is expected that this additional feature in the Montreal Harbour Cold Storage Warehouse will be much appreciated by the users of the space in the warehouse. Another important feature of this plant will be the installation of recording thermometers in the office of the General Superintendent; each will record the actual temperatures of its respective room for a period of 24 hours on a chart; the charts will be renewed each day at a definitely fixed hour and filed away for future reference. These charts will remove any question of dispute between the owners of goods stored and the Harbour Commissioners as to whether proper or specified or guaranteed temperatures were reasonably maintained or not. In addition to these recording thermometers, each room will be furnished with an indicating thermometer, so arranged that the temperature of the room can be ascertained by the floor operators without opening the door of the cold room.

The whole of the cold storage floors will be refrigerated by means of the circulation of calcium chloride brine through pipes and coils in the rooms, this brine being previously cooled to a very low temperature in the power house by means of the expansion of anhydrous ammonia. In many cold storage plants, owing to its being somewhat cheaper

in first cost, the ammonia is expanded direct in the pipes in the rooms, but however carefully such a system is erected and maintained, there is almost always a leakage of ammonia, which has a very detrimental effect on food products. With the brine circulating system, a leak will not only be more easily located but it does not have the same damaging effect on the goods stored. The temperature will vary from 35 degrees F. to minus 5 degrees F., according to the class of produce stored; the principal contents will be beef, pork, bacon, eggs, apples, cheese, fish, butter and fruits.

Although the building will be of such a fireproof character, yet it will be equipped with a most up-to-date automatic fire sprinkler system, the primary supply of water to be taken from the city mains, and the secondary supply from the three tanks above the roof, each containing 15,000 gallons. In addition, the whole building will be divided into two almost equal divisions, from the roof to the second floor, by a fireproof wall running the full width of the building; also this wall, all elevated openings, all stairways openings, etc., will have automatically fire-closing doors. All these precautions will be, principally, for the protection of the goods stored, and will result in a very considerable reduction of the insurance rate to that paid at present in any of the other cold storage warehouses in Canada.

Although the power house, situated on the other side of Beaudry Street, will be small in comparison to the warehouse, yet it will be a very imposing and handsome structure. Its outside appearance will be in keeping with that of the warehouse, and will consist of a basement, two floors and a condenser house on the roof. Two-thirds of the power house will be used to accommodate the mechanical refrigerating equipment for the cold storage warehouse, and the

remainder will be used for the rotary and static electric transformers and the switchboards for the Harbour Electric Railways. The whole of the refrigerating equipment in the power house has been so designed that the maximum efficiency, safety and continuity of service will be assured, and proper provision will be made for the extension of the equipment when extra refrigerated floors in the warehouse are needed.

In order to obtain a flow of very cold water for the ammonia condensers a 10-in. well has been bored to a depth of about 1,150 ft., adjacent to the power house. This well will be operated by what is known as an Air Lift, the water being lifted from the bottom of the well to the surface by means of compressed air. There will be a supply of 12,000 to 14,000 gallons per hour at a temperature of about 50 degrees F. all the year round. A small ice-making tank and equipment will be installed in the power house, of a capacity of 5 tons per day. This ice will be used for the icing of refrigerator cars in use by the Harbour Commissioners.

The construction work done during 1919 in connection with the warehouse and power house has been the boring of the artesian well, the preparation and excavation of the site and the concrete piling for the foundations.

There is no doubt as to the need of a large modern cold storage warehouse in Montreal, especially on the Harbour frontage. For an average of five months out of each year, the Harbour is closed to shipping on account of weather conditions, but the produce of Canada and the demand for same from Europe continues during the whole twelve months. It is, therefore, obvious that this extra producing period must be taken care of, either by shipment of the produce through United States ports or, if intended for

shipment from Montreal, to store it under proper conditions until navigation re-opens. Even during navigation periods, a cold storage warehouse is essential to all modern up-to-date ports, so that perishable goods can be safely held for such length of time as may suit the sailings of the ships. In the case of Montreal, the cold storage warehouse should not only be a source of revenue as a storage plant, but it should also result in extra shipping using Montreal as a port which previously used United States ports for the produce business.

It is, of course, understood that in order to obtain the highest efficiency and the best results from a Harbour cold storage plant, the produce must be delivered from the warehouse to the ships without delay. Any transhipping of perishable goods which have been held in cold storage, whether by means of refrigerator cars, barges or otherwise, must not only increase the cost of the goods by such re-handling, but it is highly detrimental to the goods, owing to the almost unavoidable delays and differences of temperatures to be contended with. The whole of the benefits of months of cold storage can be irremediably undone by careless transhipment covering a period of only an hour or two. The Harbour Commissioners of Montreal are alive to the importance of prompt and efficient transference of goods from the cold storage warehouse to the ships, and it is proposed to provide accommodation at the wharf immediately opposite the warehouse for transatlantic ships, so that the loading of same can be accomplished by means of suitably insulated conveyors from the warehouse when so desired.

CONSTRUCTION WORK COSTS

In the Report of the Montreal Board of Trade, the table of the trade of the Port of Montreal gives the following figures:—

Years	Value of Merchandise		
	Exported	Imported	Total
1919.....	\$352,648,960	\$212,254,348	\$564,903,308
1918.....	388,091,717	178,021,111	566,112,828
1917.....	534,876,677	214,885,029	749,761,706
1916.....	382,741,463	194,924,348	577,665,811
1915.....	155,685,953	115,919,977	271,605,930
1914.....	119,478,589	140,591,068	260,069,657
1913.....	99,398,102	154,485,087	253,883,189
1912.....	87,679,422	148,977,605	236,657,027
1911.....	71,254,446	129,811,810	201,066,256
1910.....	71,642,648	114,473,845	186,116,493

At the opening of the War, Montreal Harbour was fortunate in being in an advantageous position regarding facilities.

During the War the Commissioners, at the request of the Government, almost entirely stopped construction work and the provision of additional facilities to meet the growing demand. Meanwhile the trade of Canada has advanced by leaps and bounds and the experience of the year 1919, after the War, demonstrates that the increase in trade and commerce is stable and will continue.

New facilities in the Port of Montreal having practically stopped during four years, the Harbour Commissioners recommend liberal expenditures to meet the requirements of Canadian trade via Canadian transportation routes, to be shipped via the St. Lawrence route.

The cost of construction work, owing to the increased prices of labour and material, has advanced by leaps and bounds.

Most contractors are now unwilling to accept work on a competitive basis and will only quote on a cost plus basis or at a prohibitive price.

The Harbour Commissioners have, however, plant available for construction work and with their facilities are able to carry on work more advantageously than possibly any other organization, and in view of the incessant demand and the urgent necessity of providing facilities year by year to meet the growth of trade and commerce in Canada, no effort will be spared by the Harbour Commissioners of Montreal to keep pace with the growth of Canada.

The efforts of the Commissioners are being specially directed to the completion of works absolutely necessary to keep up with the rapid growth and development of the Port.

The extra cost of construction work is serious. The great sheds being constructed on the Victoria Pier will cost over twice those constructed before the War, the cold storage warehouse will cost nearly one hundred per cent. over the estimate made some two years ago, but such is the demand for both accommodations that it is estimated by the trade that the investment will yield a good return on the money expended.

PUBLIC COLD STORAGE WAREHOUSE PILE FOUNDATIONS

To support the massive cold storage warehouse and power house, it was found necessary to contract for about 3,000 foundation piles, each to carry a working load of 40 tons.

The site of this cold storage plant is on the original beach of the river. Over the original beach, old wharves have been constructed and the ground filled to a depth of from 12 to 18 ft. by the deposit of disintegrated shale filling and other materials taken from the bed of the river during dredging operations.

Between the artificial fill and the original beach or river bed, borings showed a doubtful stratum.

It was considered absolutely essential that the piles should be driven entirely through this artificial fill and the doubtful stratum, so as to penetrate deeply into the original compacted beach or bed of the river.

Experimental wooden piles were driven and an experiment was made by driving sample concrete piles.

Finally a contract was awarded, after careful consultation, to the MacArthur Concrete Pile and Foundation Co., of Montreal, whereby they agreed to drive piles to refusal of 1" to 15 blows of a No. 1 Vulcan Steam Hammer which, with the experience in Montreal of this type of pile, it was believed would suffice to drive the majority of the piles through the artificial material into the compact ground.

The Company also contracted to drive 750 lin. ft. of piles per day.

After the preliminary work and awarding of the contract, the construction work proceeded satisfactorily. The company readily agreed to continue the driving beyond the contract limit so as to secure greater penetration. Most of the piles reached a penetration of several feet below the bottom of the artificial ground, the average penetration in the original bottom or beach of the river being about 4 feet.

The guarantee of 750 lin. ft. per day was exceeded.



Site of Cold Storage Warehouse Piling. Nov. 14th, 1919

Description of the Piles.

The piles used were those known as "pedestal piles," formed by driving a steel core and shell, then removing the core and filling the shell with concrete. For driving the piles the contractor used three wooden pile-driving towers with leads sixty feet high, equipped with a 6,000 pound No. 1 Vulcan steam hammer; hammer and tower combined weighing about twenty tons. One $\frac{1}{2}$ yard Ransome and one $\frac{1}{3}$ yard Smith steam driven concrete mixers were used for filling the pile shells, the concrete being placed by special one-half yard buckets. Cores and shells were used up to forty feet long.

The pile driver towers were assembled in position lying horizontal on the ground and were revolved into vertical position by tackles passing over the tripping bents and operated by a hoisting engine. When erect, they were mounted on rollers of 16-inch pipe with solid cores which were placed between the bottom frame and the track sills. The steam-operated hoisting engine, which raised and lowered the hammer and provided the steam to operate it, also operated a tackle by which the tower was pulled forward on the rollers or skidded sideways on them, it requiring not more than one minute to set the machine in position for driving a new pile after the previous one had been finished.

The core was a steel pipe furnished with a shoulder near the top which rested on the top of the 16-inch steel shell, the top of the core projecting twelve inches above the shell and containing an oak driving block. The shell with the core in it was driven to one inch refusal under 15 to 30 blows; the core was then removed and the shell filled with concrete by means of the special bucket referred to above, the bucket

depositing about six cubic feet of 1:2½:5 concrete each time. After the charge of concrete, the shell was raised about two feet, so that the concrete was driven into the surrounding ground, and it was calculated that the resulting pedestal had an average diameter of about 2½ feet, whereas the shell was only 16 inches in diameter. After each charge of concrete, the core was replaced and operated upon by the hammer so as to compact the concrete. The tops of the piles were finished flush with the surface of the ground.

The driving of the 3,000 piles was completed in 107 days total elapsed time. The working force averaged about sixty men, who made a daily average of 54 piles with the three machines, the maximum record of any one machine being 32 piles. These piles averaged nineteen feet in length. The total amount of concrete used was about 3,600 yards.

Test of Piles.

In order to ascertain the condition and efficiency of the piles, an excavation was made which uncovered four of the piles to their extreme bottom, and one of the piles was subjected to a test load of sixty-five tons. This load produced a vertical displacement of only $\frac{1}{8}$ inch, and this was due to compression and not to settlement, since the top of the pile returned to its original position with the removal of the load. The test load of steel billets was left on the pile for several weeks but no movement could be detected.

Artesian Well.

In order to provide a natural supply of water which could be utilized for refrigerating or cooling purposes in connection with the cold storage warehouse, it was decided to sink an artesian well some 225 ft. east of Beaudry St. tunnel.

The contract for this work was given to Messrs. Wallace Bell & Co., well drillers. The drilling operations extended over a period of some five months.

A 10-in. well was sunk to a depth of 1,005 ft. with an additional 100 ft. of 6 ins. bore.

The method used for drilling can be briefly described as consisting of a 10-in. churn bit together with drilling tools, weighing approximately 2,100 lbs., and suspended to a walking beam by means of a $\frac{7}{8}$ " steel wire, there being a swivel joint between the drilling tool and the steel wire and a screw connection between the wire and the walking beam by which the tool is rotated and lowered slightly between the blows. A steam cylinder operates the walking beam which alternately lifts and drops the bit or drill.

Upon completion of the work, a final flow test was made which gave the following results:

12,000 gallons of water per hour.

Static level, 70 feet from surface.

Pumping level 200 feet from mouth of well.

Temperature of water 48 degrees F.

ELECTRIFICATION OF STEAM-OPERATED HARBOUR RAILWAY TERMINALS

The Montreal Harbour Railway Terminals consist of Surface Lines situated between Victoria Bridge and the Imperial Oil Wharf, having a total trackage of 58 miles.

During the summer season of 1918, nine steam locomotives were in operation, and it was seen that if the service was to be maintained to its highest efficiency additional locomotives would be required to avoid congestion in the Terminals.

Important electrified freight terminals were visited, and conditions closely studied, with a view of adopting the best system for the Montreal Harbour Terminals.

Electrification for freight yards and terminals has been found very economical and satisfactory in every way, electric locomotives being considerably more efficient than steam locomotives, especially during the winter months.

In view of the climatic conditions, and the highly successful operation of the Canadian National Railway Lines through the Montreal Tunnel Terminals, which have a 2,400 volts direct current overhead system in use, a similar system was considered for the Montreal Harbour Terminals, and plans and other necessary details were at once got under way for laying out the work in order that the minimum amount of time would be lost in getting the electric locomotives running.

Plans and specifications were sufficiently advanced in July, 1919, to call for tenders for the material, the work being carried out by the Electrical Department.

The work was sub-divided into four main sections as follows:—

1. Power Station Machinery Equipment.
2. Control, Protective and Signal Equipment.
3. Overhead Catenary Line Material.
4. Rail Bonding Material.

Sufficient material necessary for a start was received during September, 1919, and a commencement was made in the latter part of the same month.

Construction work was carried on steadily throughout the winter months on the overhead line work, as well as the track, it being found more advantageous to erect this material when the traffic conditions on the system were the least congested.

Power Station Apparatus.

The station is designed for an ultimate capacity of 3-1,000 K.W. motor generator sets, the units having a very heavy overload capacity for a short period to meet railway conditions, and capable of carrying 250% load for five minutes. Each set to consist of a three-piece unit consisting of a 1,500 H.P. 2,300 volt 3-phase, 60 cycles, 720 R.P.M. Synchronous Motor direct connected to a 500 K.W. 1,200 volt, 720 R.P.M. compound wound, D.C. Generator on either end, each generator being permanently connected in series giving a 1,000 K.W. at 2,400 volts.

Exciters for the Synchronous Motor and Generator fields are mounted on the same bedplate. Each of the Motor Generator sets when mounted up on its frame will weigh 40 tons, and cover a floor space of 28 ft. long by 8 ft. wide, and approximately 7 ft. high. Water-cooled, oil insulated power transformers of 2,000 K.V.H. will be installed, taking the power at the incoming lines, voltage of 11,000 volts and stepping it down to 2,300 A.C. for the Synchronous Motors. These transformers when in service will weigh approximately 30 tons each.

Control and Protective Apparatus.

The switchboards, cell, remote control, oil switches and protective equipment will be mounted on galleries on the second floor and will consist of twenty-one marble panels with the necessary meters and indicating mechanism for the complete control of the generator sets, quick acting breakers, storage batteries, power transformers and exciters.

Overhead Catenary Line Apparatus.

The overhead line equipment consists of cross span and bracket construction supporting the main messenger which is a $1\frac{7}{16}$ " extra galvanized Siemens-Marten steel cable

anchored in half-mile sections. The anchor poles are very heavily guyed in all directions. The cross spans are supported by wooden and steel poles at spacings of 150 feet on tangent double track, and 120 feet or 105 feet as conditions require on curves or yards.

Cross-span messengers consist of $\frac{5}{8}$ " high strength galvanized steel cable, the tension on all messengers being maintained at approximately 2,300 lbs. Attached to and supported by the main messenger is the conductor, consisting of 4/0 grooved hard drawn copper, fastened by hangers of various lengths, keeping the trolley at a uniform height of 23 feet above the top of the rail. The trolley is also anchored in half-mile sections, feeders energizing the sections as required.

The wooden poles are being used where development is not completed, these poles being Western cedar timber, varying in length from 40 feet to 65 feet, as conditions demand. The poles are butt treated with hot carbolineum as a preservative, and should give long life.

Steel poles are being used when permanent conditions exist, the poles being set in concrete carried well above the ground level.

Rail Bonding.

The rail bonding, while not a very noticeable part of the installation is, however, a highly important section of the system. All the return current must get back to the power station by the rails, and close attention must be paid to the method of welding the copper bonds to the rail joints in order to get the best results when the road comes in operation. Two bonding crews were at work through the winter and have placed over 7,000 bonds. The cross bonding at the switch points and cross-overs will be carried on

as soon as the frost leaves the ground. The type of bond used was a steel armoured terminal gas welded, copper stranded, bond, capacity 4/0-7" long, cold pressed and headed. The welding outfits are composed of Oxygen-Acetylene cylinders connecting to welding torches with regulating valves, flexible hose and gauges.

Steady progress is being maintained with all four sections of the construction, notwithstanding the difficulty of getting this special material, and a considerable amount of the work is well advanced.

CANADIAN VICKERS LIMITED NAVAL CONSTRUCTION WORKS

The following information was received from Messrs. the Canadian Vickers Limited, in connection with their Naval Construction Works at Maisonneuve, on a reclaimed site in the Harbour of Montreal, the site having been constructed by the Harbour Commissioners in 1910-1912:—

Vessels constructed throughout by the Canadian Vickers Limited, both as regards hulls, engines, boilers, deck machinery, etc., and delivered into service:—

Name	Dimensions	Gross Registered Tonnage
"Canadian Voyageur"	320 ft. x 44 ft. x 25 ft.	3099
"Canadian Pioneer"	400 ft. x 52 ft. x 31 ft.	5758
"Canadian Ranger"	400 ft. x 52 ft. x 31 ft.	5752
"Canadian Seigneur"	400 ft. x 52 ft. x 31 ft.	5757
"Canadian Miller"	400 ft. x 52 ft. x 31 ft.	5439
"Canadian Spinner"	400 ft. x 52 ft. x 31 ft.	5440
"Canadian Planter"	400 ft. x 52 ft. x 31 ft.	5440
"Canadian Navigator"	320 ft. x 44 ft. x 25 ft.	3161

All of the above vessels were built for the Canadian Government Merchant Marine.



View of Vickers' Floating Dock and Ship Repairing Plant

"Alsace"..... 400 ft. x 52 ft. x 31 ft. 5787

This vessel was built for French owners.

The "Canadian Voyageur" was the first vessel delivered to and operated by the Canadian Government Merchant Marine. The illustration of the "Canadian Ranger" was taken from a photograph of the ship on her maiden voyage from Montreal to Liverpool. This was the first Canadian Government cargo steamer to enter the trans-Atlantic trade.

The SS. "Alsace" was built and engined complete by Canadian Vickers, Limited, for La Compagnie Francaise d'Armement et d'Importation de Nitrate de Soude, of Paris, France. This vessel was built to 100-A-1 Lloyd's Classification and is rigged with two masts and special double system of derricks with suitable arrangement of winches for expeditious handling of nitrate cargoes.

During the 1919 season, several vessels were repaired on the Floating Dry Dock.

Shipbuilding contracts in hand for 1920 delivery comprise four 8,350 deadweight ton steel cargo vessels for the Canadian Government, and two 8,300 deadweight ton and two 6,350 deadweight ton steel cargo vessels for Norwegian owners.

CANADIAN GOVERNMENT MERCHANT MARINE

The British spirit of zeal towards the encouragement of industry and the spread of commerce and navigation is now illustrated in the Port of Montreal by the inauguration of the Canadian Government Merchant Marine.

Canadians inspecting the Harbour of Montreal in 1919 could not fail but be impressed by a visit to the depot and transit sheds occupied by the steamships flying the Canadian Merchant Marine flag.



S.S. "Canadian Ranger" built by Canadian Vickers Limited for Canadian Government Merchant Marine Limited

These two large double-storey sheds, completed during the War, and the new permanent berths adjoining, were occupied to their fullest extent during the whole of the season of navigation.

The successful demonstration of the arrival of fully loaded Canadian Government ships, carrying from new sources raw materials much required in Canada and for re-manufacturing, could not fail but result in an optimistic spirit, as it was similar ventures and similar trade which built up the great and prosperous city and port of Hamburg.

Canada would have been badly off without the sugar brought into the Port of Montreal by these ships trading to the West Indies and South America. The same may be said of hides and general merchandise.

Probably, however, the most striking feature exhibited at this depot was the fact that Canadian fully manufactured goods were being shipped through a Canadian port via splendid Canadian steamers to markets which had never before been opened for Canada.

Canadian products were not only marketable, but before being exported they were fully manufactured. Canadian railways, Canadian ports and Canadian financial interests all benefited.

The Commissioners have viewed with great satisfaction the inauguration of these Canadian Government's steamships which will mean much to the country as a whole as well as to the Harbour of Montreal, and in this connection the Commissioners take this opportunity of paying tribute to the Hon. C. C. Ballantyne, Minister of Marine and Fisheries, for his great foresight, his progressive and courageous policy in so promptly proceeding with the construction of ships for the Canadian people, a wisdom and judgment borne out by the results that have so far been attained not only from a

financial point of view, but on account of the tremendous service rendered to the trade and commerce of the country at large, the direct and indirect benefit of which can hardly be estimated.

SAILORS' MEMORIAL

On October 31st, at 11 a.m., H.R.H. the Prince of Wales visited the Harbour and laid the corner-stone of the Sailors' Memorial, which is to be erected by the Harbour Commissioners on the Victoria Pier.

The Prince of Wales embarked on the Commissioners' inspection steamer, "Sir Hugh Allan," at McGill Street for the trip down to Victoria Pier. Although there was a driving rain, the arrival of the "Sir Hugh Allan" was awaited by a large group of special guests who were assembled on a platform erected for the occasion, and also a large number of spectators.

At the landing there was drawn up a military guard of honour of the Victoria Rifles and around the platform was ranged a guard of honour from the Boys' Naval Brigade.

Following the usual greetings, Mr. W. G. Ross, President of the Harbour Commissioners, addressed the Royal Visitor.

"This pier, on which the Sailors' Memorial will be erected by the Harbour Commissioners, was named after our much-beloved Queen Victoria. It was opened by the Duke of Connaught and it was on this very site that King Edward landed when visiting this city in 1860. Now, on this historic spot, you are to-day honouring us by your presence to officiate in the laying of the corner-stone of a memorial tower to be erected as a testimony from the people of this country to the valor and bravery of the seamen of all services of the Empire during the War, especially those of the Mercantile

Marine, with whom we have been and are so closely associated. Deep in the hearts of the people lies a gratitude for their sacrifice, for their steadfastness and for their courage, which will ever stand forth as the embodiment of signal service to humanity and country. Great as has been the tribute paid to these heroes, great as has been the financial assistance given for their relief, it is as nothing compared with what they have suffered and the bravery they have shown; and this Memorial will ever stand at the gateway of Canada in this great national port, as a lasting tribute to their devotion and sacrifice.

"Your Royal Highness will ever be known among your other high titles as our 'Sailor Prince,' and it is a particularly fortunate coincidence, as it is a great honour to us, that you consented to lay the corner-stone of this Memorial to the Empire's Sailors."

The large stone having been placed by the Harbour Commissioners' 75-ton floating crane, His Royal Highness mounted the steps and said:

"I declare this stone well and truly laid. I consider it a great privilege to have been asked to lay this corner-stone of the Sailors' Memorial in the Port of Montreal. We all know what splendid work the Merchant Seamen did during the War, and I look forward to seeing a fine memorial here the next time I come."

The playing of "Rule Britannia" concluded the ceremony.

SHIPPING

During 1919, 786 sea-going vessels arrived in Port, with a tonnage of 2,179,280 tons, navigated by 46,448 seamen, as against 674 vessels with 1,933,482 tons in 1918.

Although the number of sea-going vessels arriving in Port during 1919 does not constitute a record, the number of trans-Atlantic vessels, viz.: 702, is the greatest in the history of the Harbour, the balance, viz.: 84, being vessels from the Maritime Provinces.

The usual tables of vessels arriving in Port during the year will be found elsewhere in this report.



HARBOUR RAILWAY TERMINALS

The transition from the abnormal traffic conditions of the years of war to the normal conditions of peace was not accomplished without bringing with it a considerable decrease in the volume of business and while there still remained during the winter months of 1919 vestiges of the war work, such as the compression of hay in Sheds 24 and 25, and the handling of large quantities of steel billets and plates contracted for during the War, the traffic returns during that

period show a decrease of over 20% as compared with last year. Eliminating, for comparative purposes, the past four years, we find, however, that the winter season of 1919 was far ahead of any of the pre-war years.

A similar decline in the volume of traffic during the season of navigation could not but be expected in face of the slackening of the war activities which had reached their height during 1918. To account for this falling off in railway traffic it is only necessary to note that there was a decrease of over 12,000 cars of grain handled at the Harbour Elevators and that the interchange traffic between the Railway Terminals in the eastern and western ends of the City, using the Harbour Terminals as an intermediary, also gave a decrease of more than 10,000 cars, these two factors alone representing above 90% of the total decrease in car handling.

An analysis of the year's figures tends to show, however, that the actual import and export traffic, grain excepted, did not decrease to any measurable extent, as the number of cars handled directly to and from the Harbour sheds reached over 40,000, a decrease of only 1% over 1918, when thousands of cars were handled at Sheds 24 and 25, where probably the most extensive traffic operations in the history of the Port had been carried out, at one given point, since the beginning of the War.

No new source of traffic of an exceptional nature or of great proportions developed throughout the year. The eastern terminus of the Harbour Railways was, however, put to some use when, in the early part of July, direct traffic movements were inaugurated to and from the Imperial Oil Company's plant at Section 101, although legal impediments prevented this traffic from gaining anticipated proportions.

A re-arrangement of the tracks at the Canada Cement Company's Lakefield Plant also provided facilities for handling traffic from there on a large scale, but for the reason given above, practically no shipments were routed via the Harbour Terminals. It had been expected that a large amount of traffic would be derived from these industries and the results obtained so far are very disappointing, and it would be a matter of regret if all possible effort were not put forth to work up this traffic in order that the extension of the Harbour tracks may be made, in a measure, profitable.



Shipping direct from car to ocean vessel

The Canadian Government Merchant Marine, Ltd., at Sheds 24 and 25, furnished railway traffic of very satisfactory volume and the results of the first year's service augur well for the future.

During the season, some passenger service was performed in handling repatriated soldiers of the Canadian Expeditionary Force and also of the Imperial Forces from Siberia.

With the resumption of the Harbour Improvement Scheme, new works intimately related to this Department were put under way, such as the construction of the new sheds on Victoria Pier, the Cold Storage Warehouse and Power Plant at Sections 22-23.

These new works curtailed to no small extent the available track space, and to make up for this loss new tracks were laid on the low level at Sections 28-29 and on Common and Commissioners Streets extending from McGill Street to Section 20, opposite Elevator No. 2. The latter sidings, which are double track most of the distance, are to connect with the present tracks inside the flood wall through the opening at Section 15 and are to be used as receiving and delivering tracks, but were not put to any great use this year owing to opening in the wall not having been widened to permit of switching operations being carried on from the tracks inside the Flood Wall to the new tracks outside the wall.

Also, as a part of the Harbour Improvement Scheme, the electrification of these Terminals was begun, under the supervision of the Engineering and Electrical Departments, from Section 39 to the eastern terminus.

The usual repairs to the plant and equipment were carried out by the Commissioners' employees economically and satisfactorily.

The general operations of the Department throughout the year were also successfully accomplished, due in most part to entire absence of any labour troubles so prevalent in other ports, which speaks highly for the good understand-

ing existing between the Commissioners and the employees of the Department.

The following table gives the mileage of Harbour Railway tracks and the number of cars handled during the last 10 years:—

	Mileage of Harbour Railway Tracks	Number of Cars handled by Commissioners
1910.....	28.86	79,466
1911.....	28.97	93,859
1912.....	34.91	112,911
1913.....	37.30	114,531
1914.....	39.88	114,449
1915.....	44.92	157,480
1916.....	49.11	234,439
1917.....	52.35	215,394
1918.....	55.35	247,009
1919.....	58.32	182,328

The extent of the Harbour Commissioners' Railway tracks at the end of 1919 is as follows:—

	lin. ft. or miles
South of Lachine Canal, Bickerdike Pier, Windmill Point Wharf and West.....	27,759 5.2574
Sections 12 to 46, High Level, Main Line tracks.....	51,170 9.6913
To piers, elevators, crossovers and sidings, etc.....	107,418 20.3442
Sections 35 to 46, Low Level, Main Line tracks.....	12,150 2.3011
Sections 46 to 101, High Level, Main Line tracks.....	54,014 10.2299

To wharves, industries, etc.....	42,764	8.0992
To Guard Pier.....	10,400	1.9697
To South Shore, St. Lambert.....	2,300	0.4356
Grand total tracks end 1919....	307,975	58.3284
Grand total tracks end 1918....	292,260	55.3521
Increase in 1919.....	15,715	2.9763

Harbour Railway Extension to Pointe-aux-Trembles.

Following the completion of the High Level Railway to the Imperial Oil Works, Montreal East, at the end of last year, several contingent extensions and improvements were effected this year as follows:—

The spur embankment from the main line to the Imperial Oil Wharf was begun and continued steadily to completion, thereafter the riprap protection on the outer face of the embankment of the whole section from Vulcan Wharf to Montreal East was completed, all deficiencies due to settlement and winter conditions being made good.

The quantities of material used were:—

	cu. yds.
	in situ
Spur embankment.....	6,000
Riprap protection.....	22,000
Total.....	28,000

A direct connection to the No. 1 Plant of the Canada Cement was established, the Harbour Commissioners laying a short spur track to the Harbour Boundary and the Company continuing to spur from that point to a junction with their track near Notre Dame Street.

By arrangement also with the Imperial Oil, Ltd., a great improvement was made in the railway connections to the Oil Works at Montreal East. Additional accommodation was provided by the trebling of the former double track main line between these two large industrial plants.

	cu. yds. in situ
Embankment.....	5,000
	<hr/>
	lin. ft.
Spur to Canada Cement Co.....	200
Improvement to connections at Imperial Oil.....	240
Additional track on Harbour property crossover.....	150
Third main line track.....	1,510
	<hr/>
Total.....	2,100

High Level Railway Widening between Papineau Ave. and Jail Subways.

This section of the High Level Railway was widened and two additional tracks laid down to make good part of the deficiency. The work comprised the taking down of the existing temporary retaining wall and rebuilding it about 30 ft. farther out; the widening of the existing embankment, and the laying of two additional parallel tracks, with ladder to main line at the west end, the eastern ends being left open for future extension.

The principal unit quantities were:—

Taking down and rebuilding temporary re-	
taining wall (rubble-faced, stone-filled cribwork 6' x 9').....	912 lin. ft.
Embanking.....	24,000 cu. yds.
New track	1,972 lin. ft.

New Low Level Tracks at Sections 27-28.

Further additional car storage was provided by the construction of two sidings on the new Low Level Wharf at Sections 27-28.

Total length of track laid was 2,859 lin. ft.

Extension of Harbour Tracks on to Common and Commissioners Streets.

In the expectation of heavy shipments of grain from the West by rail last fall, it was necessary, if congestion was to be avoided, to greatly increase the siding accommodation adjoining the Commissioners' elevators. The only space available for this purpose was the strip of Harbour property on Common and Commissioners Streets lying between the Harbour Boundary and the Flood Protection Wall. The Montreal Tramways Co. and the Light, Heat & Power Co. being accordingly called upon to alter the positions of tracks, power lines, etc., to permit of Harbour tracks being laid down parallel to the Flood Wall, the former completely removed their tramways tracks from St. Peter Street to Berri Street, while the Power Co. made the necessary alterations to their lines as required. The railroad tracks were then laid down just clear of the Flood Wall, as rapidly as possible from a junction with the Grand Trunk tracks at McGill Street and terminating in a junction with the old C.P.R. track at Victor Street. While this work was in progress, the City Authorities repaved the northwest half of Commissioners Street from the Customs House to Jacques Cartier Place with granite and the Commissioners similarly paved the portion on their property from the Harbour boundary to the side of the railway. On other sections, the Commissioners also continued the paving to

the side of the railway except between St. Peter and McGill Streets where the paving was carried right over the track to the Flood Wall, and at all entrances to the Harbour good paved crossings were provided.

Excavation.....	6,000 cu. yds.
Track laid.....	8,113 lin. ft.
Paving.....	10,276 sq. yds.

Industrial Sidings.

Molasses Products Co.—The establishment of a molasses storage plant at Desery St. necessitated the laying down of a new siding for use of the Company alongside.

Track removed..... 25 lin. ft.

Track laid..... 277 lin. ft.

Canadian Spool Cotton Co.—On the requisition of this Company a siding was laid into their works near Lasalle Ave. early in August.

Track laid on Company's property..... 494 lin. ft.

Track laid on Harbour property..... 91 lin. ft.

Total..... 585 lin. ft.

Imperial Munitions Board (Sec. 82).—On the dismantling of the St. Lawrence Explosives Storage at Longue Pointe by the Imperial Munitions Board, the siding laid down last year mostly on the property of the Board, was removed and part relaid on Harbour property.

Additional track laid on Harbour property... 328 lin. ft.

Renewal of Rails on Main Lines.

Preparatory to electrification of the Harbour Railway System, Main Line No. 2 was renewed from Berri Street to Letourneau Ave., Maisonneuve.

Amount of 85-lb. rail relaid..... 10,000 lin. yds.

SUMMARY OF RAILWAY EXTENSIONS

Earthwork:—		cu. yds.
Excavation, Common and Commissioners Sts...	6,000	
Embanking:—		cu. yds.
		in situ
Embankment, spur to Imperial Oil Wharf.....	6,000	
Riprap, Vulcan Wharf to Montreal East.....	22,000	
Embankment, Third track Canada Cement Co.,		
to Imperial Oil.....	5,000	
Widening Papineau to Jail.....	24,000	
		57,000
Total.....	57,000	
New Tracks:—		
High Level Railway Extension to Pointe-aux-Trembles.		lin. ft.
Connection to Canada Cement Co.....	200	
Connection to Imperial Oil Ltd.....	240	
Crossover.....	150	
Third track Canada Cement to Imperial Oil....	1,510	
		2,100
High Level Railway Widening Papineau Ave. to		
Jail Subway.....	1,972	
On Common and Commissioners Streets.....	8,113	
On Low Level Wharf, Sections 27-28.....	2,859	
Industrial Sidings:—		
Molasses Products Co. (additional).....	252	
Canadian Spool Cotton Co.		
(On Harbour property).....	91	
(On Company's property 494').		
Section 82 (additional on Harbour property)...	328	
		15,715
Total additional track on Harbour property..	15,715	
Equal to 3 miles approximately.		

NEW WHARVES

Wharf construction, completely suspended during the last two years of the Great War, was resumed and the scheme of Harbour Improvements inaugurated in 1910 was continued. Two important items under this scheme were proceeded with during the year, as follows:—

Extension of Jacques Cartier Pier.

This work comprised the lengthening of the existing pier 218' on the east side and 273' on the west side to bring the end of the pier to the new uniform pierhead line, on which it measures 294'. The extension, therefore, called for the construction of 785 lin. ft. of standard high level quay wall. The pier, as extended, will measure approximately on the east side 1,020' and on the west side 1,115' as against roughly 800' and 850' respectively on the old pier. The cribwork of the existing pier is founded at a depth of about 32' E.L.W., but the extension was put down to 36' E.L.W.

For speed in construction the entire substructure of the enclosing quay wall was designed to consist of two large cribs, No. 1 forming the East side and two-thirds of the end of the pier extension and No. 2 the West side and one-third of the end.

Crib No. 1 was towed down channel and put in position without mishap on 16th July, and sunk on 22nd July. This crib is by far the largest crib ever built and sunk in the Harbour of Montreal, the combined length of both limbs being about 418', while the previous record for length was 268' for a low level crib sunk at Market Basin a few years ago.

Crib No. 2, also of record size, the combined length being about 367', was sunk on 9th Sept., thus completing the contour of the entire extension.

The other operations followed in the usual rotation, the rock fill of the crib; the placing of R.C. shells on top of the crib, special curved shells being required for corners; and the forming of the mass concrete superstructure, with its usual details of expansion joints, tie rods, ladders, mooring rings, etc., to an elevation of 107, or half height.

Buttresses for shed foundations were as usual incorporated with the quay wall, but at much closer centres to suit the construction of the existing sheds. It was also decided to fill the core of the extension of the pier entirely with rock to avoid the necessity of piling or other structural supports for future shed foundations.

The quantities of principal units are as follows:—
Preparation of crib sites:—

Dredging.....	7,820 cu. yds. scow
Filling.....	7,320 cu. yds.
Cribwork (length 785').....	906,146 cu. ft.
Mass concrete.....	6,050 cu. yds.
R.C. forms.....	6,123 cu. ft.
Filling (wharf) by derrick.....	98,475 cu. yds. scow

Extension of Shore Wharves at Section 30.

The continuation of new shore wharves from Section 30 to the Dominion Coal Co.'s wharf at Hochelaga was resumed.

Two cribs 140' long, 36' and 36' 3" deep respectively, were built and sunk, and a third crib of equal length was built to depth of 23' and held in stock for next year.

The completion of the extension of the Delormier Ave. Sewer also permitted the filling of the section of wharf constructed in 1916 to be proceeded with.

The quantities of principal units are as follows:—

Dredging on crib sites.....	7,950 cu. yds. scow
Cribwork built and sunk. 363,925	
Cribwork unfinished..... 132,437	
	———— 496,362 cu. ft.
R.C. shells (in stock).....	1,772 cu. ft.
Filling by derrick..... 44,500	
Filling by City Contractors. 39,000	
	———— 83,500 cu. yds.

SUMMARY OF WHARF CONSTRUCTION

	cu. yds.
Dredging on crib sites:—	
Jacques Cartier Pier Extension.....	7,820
Shore wharves, Sec. 30.....	7,950
	———— 15,770
Filling on crib sites:—	
Jacques Cartier Pier Extension.....	7,320
Cribs built and sunk:—	
	lin. ft. cu. ft.
Jacques Cartier Pier Ext. (cope line)...	785 906,146
Shore wharves, Section 30 (cope line)...	280 363,925
	———— —————
Total built and sunk.....	1,065 1,270,071
Unfinished crib, shore wharves, Sec. 30.	140 132,437
	———— —————
	1,206 1,402,508
Quay Walls (Mass Concrete):—	
Standard High Level, built half height:—	
	lin. ft. cu. yds.
Jacques Cartier Pier Ext. (cope line) ..	785 6,050

Back Fill:—

Jacques Cartier Pier Ext. (by dks.).	98,475
Shore wharves, Sec. 30 (by dks.)	44,500
Shore wharves by City Contractors	39,000
<hr/>	<hr/>
Total Back Fill.	181,975 scow

DREDGING AND FILLING

The following were the principal items:—

Extension of Bickerdike Pier.

Two dredges worked steadily all season on the channel and crib seats for the proposed south side of the Bickerdike Pier. The cut 330' wide was advanced about 400', the actual area covered being 148,000 sq. ft. or about 3½ acres. The material was entirely shale and trap rock, the latter in places very hard, and depths obtained varied from 33' on crib seats to about 13' on hardest spots, the average throughout being about 21' below extreme low water.

Channel behind St. Helen's Island.

As soon as all dredging for crib seats and maintenance was done a dredge resumed this work on 15th August at the point left off at the end of 1917, and the cut was extended about 250', with a width of 300' and depth of 20' at E.L.W. The precise area covered was 105,000 sq. ft. or about 2½ acres.

The material was mainly hard pan and boulders, but shale rock is now being encountered at the south side of the cut and a considerable quantity of this material was also dredged.

Government Dredge No. 1 was engaged widening the Ship Channel opposite the Dry Dock during the season and provided the Commissioners with 6,200 cu. yds. of material for reclamation above the Dry Dock.

Reclamation above Dry Dock Site.—The filling in of the bight between the Sutherland Pier and the Dry Dock Site was begun by floating derrick on May 13th and No. 1 Crane (Browning 3-yd.) was put in commission on the work on July 27th, the amount of filling done, measured *in situ* being 111,000 cu. yds.

Dredging and Disposal.

Dredging:—	cu. yds.
Bickerdike Pier Extension (rock).....	238,540
Channel behind St. Helen's Island.....	39,750
Cribseats.....	15,770
Maintenance.....	1,000
Dredge No. 1 Marine and Fisheries.....	6,200
Ballast from ships, etc.....	52,010
By Crane No. 1 (<i>In situ</i> 29,050 cu. yds.).....	43,575
Total.....	396,845

Disposed of as follows:—

Channel behind St. Helen's Island:—

Reclamation above Dry Dock (dumper)	39,750
---	--------

Cribseats:—

Reclaimed above Dry Dock (derricks)	14,250
Jacques Cartier Pier (dumper)	1,520
	—
	15,770

Maintenance:—

Entrance to Market Basin (dumper)	1,000
---	-------

Dredge No. 1 (M. & F.):—

Reclamation above Dry Dock (dumper)	6,200
---	-------

Ballast, etc.:—

Reclamation above Dry Dock (derrick)	21,700
Railway embankment do	7,950
Jacques Cartier Pier do	7,450
Vulcan Wharf do	4,950
Section 30 do	4,860
Section 40 do	2,700
Guard Pier do	2,400
	—
	52,010

Crane No. 1:—

Reclamation above Dry Dock	43,575
--------------------------------------	--------

Total	396,845
-----------------	---------

NEW BUILDINGS

The concrete foundation and the steelwork for three new sheds, Sheds 17, 18 and 19, were erected this Fall.

The three sheds will have two decks when finished and a conveyor gallery system of two belts.

They will be provided with modern fireproof offices and workrooms.

The dimensions of the sheds are:—

Shed 17—310 ft. long by 100 ft. wide.

Shed 18—530 ft. long by 85 ft. wide.

Shed 19—520 ft. long by 85 ft. wide.

For the first time in the construction of sheds on the Harbour front no piles were used in the foundation work, the system of spread footing being resorted to.

Locomotive Shop in Harbour Yard.

The new Harbour Yard on Notre Dame Street East was provided with carpenter and blacksmith shops, locomotive garage and cleaning house and coal tower, but no locomotive repair shop was thought necessary at the time. The increasing amount of railway traffic on the Harbour tracks, all handled by the Harbour Traffic Department, necessitates an extensive amount of repair work, which decided the Commissioners to erect a suitable repair shop.

Plans for a modern fireproof building were made and construction work is now in progress.

The building will be 130 ft. long, 42 ft. wide, and will be provided with a 30-ton traveller crane and a pit.

The structure will be of steel, the foundations, walls, and floor and roof will be of concrete. A mastic asphalt flooring will be laid; also a five-ply tar and gravel roof.

Provision has been made at one end of the building for sand-drying and a hall for the railway men.

WHARF PAVING

The first consignment of scoria blocks for several years arrived during the summer, and the remaining portion of the paving of the low level Market Basin, amounting to 3,500 sq. yds., was completed.

CITY SEWERS

The City Authorities in the course of the year authorized the Harbour Commissioners to proceed with the extensions of the Delormier Ave., Desery St. and St. Just St. sewers across Harbour property at the expense of the City, and all three extensions were satisfactorily completed by the end of the year. There still remains the reconstruction of the Nicolet St. sewer, which it is hoped the City will undertake at an early date.

Repair of Water Intake System at Imperial Oil Wharf, Montreal East.

At the requisition of the Imperial Oil Ltd., plant, labour and materials were supplied for the repair of the company's water intake system on the Commissioners' wharf at Montreal East.

HARBOUR COMMISSIONERS' GRAIN ELEVATOR SYSTEM.

The following is a record of the receipts and deliveries for the Harbour Commissioners' Elevator System and for the Grand Trunk Elevators "A" and "B" for the year 1919:—

The capacity of these elevators is as follows:—

Elevator No. 1.....	4,000,000 bushels
Elevator No. 2.....	2,662,000 "
Grand Trunk Elevators.....	2,150,000 "

Elevator No. 1

Date first vessel unloaded, April 28th, 1919.

Date last vessel unloaded, December 11th, 1919.

Total receipts, 16,772,923 bushels.

By water, 13,060,051 bushels, taken from 194 steamers and 36 barges, or 230 vessels.

By cars, 3,712,872 bushels, unloaded from 2,595 cars.

Delivery was made as follows:—

	bushels	bushels
By conveyors.....	17,297,979	
“ cars.....	2,026,085	
“ teams.....	71,789	
“ bags.....	134,782	
	—————	19,530,635

Number of bushels in stock at end of season, 2,295,335.

Elevator No. 2.

Date first vessel unloaded, May 1st, 1919.

Date last vessel unloaded, November 21st, 1919.

Total receipts, 18,736,400 bushels.

By water, 3,701,874 bushels, taken from 62 steamers and 18 barges, or 80 vessels.

By rail, 15,034,526 bushels, unloaded from 9,960 cars.

Delivery was made as follows:—

	bushels	bushels
By conveyors.....	12,743,302	
“ cars.....	3,117,238	
“ teams.....	807,837	
“ bags.....	1,152,547	
	—————	17,820,924

Number of bushels in stock at end of season, 1,336,463.

Floating Elevators.

Amount of grain transferred during season, 20,326 bushels.

One floating elevator only was operated during the season.

**Total Quantity of Grain Handled or Transferred, 1906
to Date.**

Elevators Nos. 1 and 2

	bushels
1906.....	944,321
1907.....	1,078,289
1908.....	8,661,350
1909.....	11,691,071
1910.....	21,526,727
1911.....	21,007,164
1912.....	25,561,655
1913.....	44,000,000
1914.....	62,250,000
1915.....	37,317,367
1916.....	51,548,720
1917.....	42,831,504
1918.....	45,520,688
1919.....	35,509,323



Flour in upper storey of Steel Sheds waiting shipment

HARBOUR COMMISSIONERS' ELEVATORS NOS. 1 AND 2, 1919

Month	Cars Unloaded			Vessels	Receipts, Bushels	Deliveries, Bushels	In Store end of Month
	C.P.	G.T.	C.N.				
January.....	307	42	48	397	..	609,851	409,689
February.....	99	75	66	240	..	389,787	339,132
March.....	70	64	7	141	..	217,042	369,284
April.....	555	58	9	622	2	977,121	2,644,469
May.....	2,871	70	12	2,953	52	7,209,461	6,286,361
June.....	1,160	87	5	1,252	31	3,636,202	4,603,749
July.....	476	215	13	704	27	2,460,620	2,910,704
August.....	488	17	3	508	48	3,504,550	4,263,799
September.....	1,125	10	9	1,144	45	4,166,825	4,647,439
October.....	2,935	21	18	2,974	63	7,724,367	4,782,222
November.....	1,413	17	39	1,469	38	4,116,768	4,297,451
December.....	119	13	19	151	4	496,725	1,797,260
	11,618	689	248	12,555	310	35,509,323	37,351,559

GRAND TRUNK ELEVATORS "A" AND "B", 1919

Month	Cars Unloaded	Lake & Canal Vessels Unloaded	Receipts	Deliveries	In Store end of Month
January	131	..	201,114	78,991	2,383,420
February	45	..	68,455	87,157	2,364,718
March	20	..	38,730	128,642	2,274,812
April	157	2	366,507	1,447,355	1,200,131
May	1,842	16	3,402,934	2,593,018	2,009,995
June	1,464	17	3,033,561	3,245,769	1,806,459
July	981	22	2,369,568	2,479,201	1,694,636
August	886	17	2,248,921	2,976,805	979,900
September	411	17	1,293,861	1,557,977	715,384
October	1,928	15	3,621,940	2,407,588	1,936,596
November	1,244	13	2,525,812	2,550,446	1,901,962
December	58	..	77,031	388,064	1,607,377
	9,167	119	19,248,434	19,941,013	

ELECTRICAL DEPARTMENT

Power and Operation.

The Harbour Commissioners purchased, under contract, electric power from the Montreal Light, Heat & Power Co., for their requirements, as follows:—

	1917	1918	1919
	H.P. Hrs.	H.P. Hrs.	H.P. Hrs.
Elevator No. 1.....	1,103,921	1,132,229	954,350
Conveyor Galleries.....	524,574	546,381	613,869
Freight Hoists.....	102,504	74,573	77,427
Harbour Lighting.....	156,550	169,000	169,000
Miscellaneous Lighting.....	13,673	21,002	47,610
Elevator No. 2.....	1,019,670	959,652	901,268
Shed No. 16.....	14,472	34,604	34,801
Shed No. 16, Escalator....	639	323	832
Engine Shops.....	45,131	45,327	55,153
Harbour Yard.....	28,400	27,300	38,200
Hay Pressing, Sheds 24 & 25	431,998	929,115	487,442

Freight Hoists in Connection with Transit Sheds.

	Total Teams	Days in Carried Operation	Commenced Operations	Operations Ceased
No. 1, Shed No. 12:—				
1918.....	6,080	188	April 29th	Dec. 3rd
1919.....	5,273	207	Mar. 24th	Dec. 2nd
No. 2, King Edward Pier:—				
1918.....	9,650	185	April 29th	Nov. 30th
1919.....	15,314	228	Mar. 5th	Dec. 13th

No. 3, Alexandra Pier:—

1918.....	18,908	194	April 24th	Dec. 3rd
1919.....	8,756	206	Mar. 10th	Dec. 2nd

No. 4, Jacques Cartier Pier:—

1918.....	4,319	175	May 6th	Nov. 30th
1919.....	6,030	199	Mar. 21st	Dec. 2nd

No. 5, Alexandra Pier:—

1918.....	6,887	157	May 16th	Nov. 16th
1919.....	6,335	218	Mar. 7th	Dec. 1st

Electrical General.

The five Freight Hoists were in constant operation throughout the season, opening up in March for the handling of bagged flour stored in the upper storeys of the Transit Sheds.

The escalators in Shed 16 and 24 and 25 were used considerably for a great variety of freight and gave good service.

The Harbour Lighting, composed of Flame Arcs and powerful Nitrogen Units, was operated and maintained throughout the season.

The Electrical Equipment of the Head Office, Dredging Plant, Transit Sheds, Elevators, Conveyors, Freight Hoists, Escalators, Engine Shops and Sub-Stations was maintained and improved, the operating force carrying on the service without delays or accidents.

FLOATING CRANE

The Floating Crane, installed as an adjunct to the Port in 1909, has again proved itself a most valuable Harbour utility.

The value of this Crane as an adjunct to the Port can only be brought home to our commercial interests when it is known that industries are in many cases dependent upon this Crane for the receiving and shipment of many large packages essential to their successful undertakings. The Canadian Railways also benefit greatly, as otherwise the Canadian lines of transportation would only receive a small share in the freights.

The following is the record of the Harbour Commissioners' Floating Crane for the season 1919:—

	1918	1919
Number of working days.....	203	197
Number of days working.....	151	93
Number of hours working.....	1,506	826
Percentage of time in actual operation... ..	72%	47%
Total number of lifts:—		
Commercial.....	1,848	838
Commissioners' service.....	43	44
Average weight of lifts:—		
	tons	tons
Commercial.....	7	11½
Commissioners' service.....	28	26
Greatest lift:—		
Commercial.....	75	75
Commissioners' service.....	60	75
Greatest tonnage from single ship.....	142	239
Total weight lifted 1918.....	18,855 tons	
Total weight lifted 1919.....	10,999 tons	

During the War, the Crane could not be spared for docking, but in September, 1919, it was docked and the hull was given a much needed cleaning and painting.

SAWMILL AND TIMBER BOOM

The sawmill worked 230 days during the season, sawing hard and soft wood, the total amount sawn being 533,476 ft. B.M., 6,231 lin. ft. and 4,800 lin. ft. of railway ties.

The total amount planed was 218,104 ft. B.M.

The total timber and lumber delivered to the works during the season was 717,012 ft. B.M. and 328,722 lin. ft.

Total delivered to outside firms 770 ft. B.M.

CONSTRUCTION MATERIALS

The quantities of materials used during the season were:—

Unbroken concrete stone.....	5,468 tons
Broken concrete stone.....	16,090 tons
Sand.....	6,664 cu. yds.
Granite paving blocks.....	172,300 blocks
Scoria.....	276,734 blocks
Cement.....	118,760 bags
Macadamizing stone.....	453 tons
Railway ties.....	13,742 ties
85-lb. rail.....	17,970 lin. yds.
Timber.....	717,012 ft. B.M.
Lumber.....	328,722 lin. ft.

POLICE DEPARTMENT

Organized in 1913, the Harbour Police Force, consisting during the summer season of 1919, of 4 officers and 53 constables, all uniformed and armed, regulates the traffic on the wharves, maintains order and protects life and property within the Harbour. The services of 30 of these constables were continuously at the disposal of the various shipping companies during the summer.

From the 1st January to the 15th April, 1919, the Harbour Police Force consisted of 4 officers and 34 constables. The services of 6 of these constables were at the disposal of the Department of Agriculture during this period.

For the winter season, the Police Force consisted of 4 officers and 20 constables.

During the season, 72 passenger steamships docked, bringing 36,672 passengers, and the same number of vessels sailed taking 45,816 passengers, making a total of 82,488 passengers handled during the season, by the traffic constables, without accident.

134 persons were arrested on the wharves and brought before magistrates for different offences during the season.

MAINTENANCE OF DREDGING FLEET, ETC.

The following vessels wintered on the shipways:—

- Derrick No. 6
- Tug "John Young"
- Testing Boat
- Scow No. 40

The Machine Shop and Shipyard were opened January 15th, 1919.

Usual repairs were made to the dredges, derricks and tugs before the opening of navigation.

The steamship "War Toronto" having gone aground below Cap St. Michel on May 2nd, the Harbour Commissioners loaned some of their plant for the purpose of pulling her off, which was effected on May 6th.

On May 15th, work was commenced on the lifting of a sunken wooden pontoon at Market Basin, and it was raised and towed to the Guard Pier, May 31st.

Two tugs returned from Europe were repaired and fitted out at the Machine Shop for the Department of Inland Waterways and Docks in October.

Some machine shop work was done in connection with the new wharf work at Section 29 and for the extension of Jacques Cartier Pier. This consisted of tie rods, bolts, etc.

Considerable repair work was done for the Grain Elevators, Conveyors, etc.

A portion of the Harbour Commissioners' plant was engaged in the pulling off and lighterage of the Steamship "Bassa" from November 28th to December 6th.

The Dredging Fleet stopped work and was all in winter quarters by Saturday, December 13th, the usual precautions against fire being taken.

MAINTENANCE

Dredging and Sweeping.

The usual tests were made of Ship Channel, basin and berths and the only dredging necessary was the cleaning of the fairway opposite Jacques Cartier Pier as already described.

General Maintenance.

All drains, manholes, etc., were kept clear and well flushed and the water supply was maintained in good order, 32 hydrants and 13 latrines being in service. The water service to ships was greatly increased, 382 vessels being supplied with 1,425,110 cubic feet of water during the season.

Sheds and Elevators.

General repairs and maintenance work was carried out during the year on floor, sheathing, doors and roofs.

New gutters and downspouts were put on the riverside of Sheds 10 and 11.

The roofing of Sheds 5, 13, 15 and part of 8 was renewed. The total area recovered amounts to 161,800 sq. ft.

The wooden flooring of the winch gallery on upper floor of Sheds 4 and 9 was removed and a reinforced concrete slab was substituted.

New permanent fireproof offices and workrooms were erected in both floors of Shed 5.

The lower floor of Sheds 24 and 25 was concreted and a wearing surface of mastic asphalt was applied.

The roof structure of sheds 46 and 47, which is of a temporary construction, was practically all taken down and new wooden purlins and rafters were erected instead; the roofing had to be made good.

The concrete facades of the four sheds on the Tarte Pier were made as good as new.

The steelwork of the lower floor of Sheds 7 and 9 and the steelwork of both floors of Sheds 11 and 16 was thoroughly scraped and painted. The sheathing of Shed 16 was also given one coat of paint exteriorly.

The interior walls of the wharf office building next to Elevator No. 1 were repaired, cleaned and painted.

The goosenecks of the grain conveyor system were repaired where needed.

The roofing of Conveyor Galleries 3, 5, 8, 13, 15 and the section between Elevator No. 1 and shed 2 was renewed.

A temporary office of small dimensions, semi-fireproof, was erected in the top floor of Shed 15.

A wooden building 40 ft. long, 13 ft. wide was built in one of the Flood Wall gateways. This building, leased to an outsider, is used as a restaurant for the numerous men employed on the Harbour.

Railways.

The increase in mileage for the year was about 3 miles, making a total of about 58 miles of track that has to be maintained. This department becomes more important each year, and a constantly increasing gang of section and maintenance men were employed from one year's end to the other, keeping switches in order, repairing slip diamonds, renewing ties, rails, etc., and surfacing in general. During the past year no fewer than 13,742 ties were renewed and 17,970 lineal yards of rails replaced, and it reflects credit on all concerned that in spite of the enormous tonnage handled per mile, no mishap of any consequence occurred to traffic during the year.

Roads, etc.

The scavenging, watering and upkeep of paved, Tarvia, Rocmac, asphalted and ordinary macadamized roadways required the constant vigilance of a large staff of men, who succeeded in keeping the wharf surface in very creditable condition.

Life Saving Equipment.

Every precaution was taken to facilitate the saving of life and the prevention of accident by the erection of railings and the distribution of ropes, gaffs and life preservers at 115 different points along the wharf front.

Raceways at Windmill Point Basin.

Although deterioration goes steadily on, there was no serious break during the year.

GENERAL

The usual force of watchmen, etc., was employed to protect the property of the Commissioners, to guard the public from accident and to regulate the Harbour dumping ground.

The breakup last Spring was exceptionally mild, no wharf repairs or ice removal being necessary.

WATER LEVELS

The depth of water for navigation in the Montreal Harbour Ship Channel and on the Sill of Lower Lock Lachine Canal is given in the following table:—

	Depth on Old Lock Sill, Lachine Canal	Depth in Harbour Channel		
	Average 1901-1918	Average 1919	Average 1918	Average 1919
May.....	20' 1"	22' 5"	34' 4"	37' 10"
June.....	18' 9"	20' 1"	32' 8"	35' 6"
July.....	16' 9"	16' 10"	32' 2"	32' 3"
August.....	15' 8"	15' 7"	30' 6"	31' 0"
September.....	15' 1"	15' 3"	30' 7"	30' 8"
October.....	15' 1"	15' 8"	31' 10"	31' 1"
November.....	15' 2"	16' 5"	33' 2"	31' 10"

The following table shows the maximum and average number of workmen employed by the Harbour Commissioners during the season of 1919:—

	Maximum	Average
Maintenance of Harbour.....	133	104
Police.....	61	58
Construction of wharves, tracks, etc....	536	366
 Harbour Yard:—		
Carpenters, blacksmiths, etc.....	25	24
Sawmill and Timber Boom.....	20	18
 Round House:—		
Machinists, etc.....	29	27
Machine Shop.....	70	63
Shipyard.....	51	47
 Dredging Fleet:—		
Dredges, tugs, etc., crews.....	163	152
Elevator No. 1.....	32	32
do baggers.....	12	12
do shovellers.....	20	6
Elevator No. 2.....	35	33
do baggers.....	27	17
do shovellers.....	40	17
Conveyor Galleries.....	47	45
Floating Elevators.....	4	4
 Electrical Department:—		
Hoists, etc.....	82	54
Traffic Department.....	104	95

SEASON OF NAVIGATION, 1919

The channel was reported clear on April 14th. The Government ice-breaker "Lady Grey" arrived from Quebec on April 16th and the ferry boat "Longueuil" arrived on the same day.

The first ocean-going vessel, the "War Red Cap," reached the Port of Montreal on April 23rd.

The last vessel to depart from Montreal for sea was the "Canadian Planter" on December 12th, the latest date on record being December 17th, 1918.



1919
PORT OF MONTREAL

**Statement showing the Nationalities and Tonnage of Sea-going
Vessels that arrived in Port, during the Season of 1919,
that were navigated by 46,448 seamen.**

Nationality	Number of Vessels	Tonnage
British.....	503	1,646,532
American.....	229	384,555
French.....	11	37,171
Italian.....	9	24,800
Norwegian.....	9	20,193
Greek.....	12	30,875
Dutch.....	1	3,635
Danish.....	2	4,753
Brazilian.....	8	22,966
Roumanian.....	2	3,800
	786	2,179,280

Of the above, 756 were built of iron or steel, with a tonnage of 2,174,133, and 30 were built of wood, with a tonnage of 5,147 tons.

PORT OF MONTREAL.

Statement showing the Classification of Trans-Atlantic Vessels that arrived in Port during the past ten years.

Year	Steamships		Barques		Ships and Brigs		Schooners		Grand Total	
	No.	Tonnage	No.	Tonnage	No.	Tonnage	No.	Tonnage	Vessels	Tonnage
1910.....	410	1,656,794	..	....	1	1,620	..	...	411	1,638,414
1911.....	401	1,695,613	..	....	..	...	..	...	401	1,695,614
1912.....	409	1,775,487	..	....	..	....	..	...	409	1,775,487
1913.....	477	2,020,333	..	....	..	....	..	...	477	2,020,333
1914.....	551	2,039,133	..	....	..	....	..	...	551	2,039,133
1915.....	483	1,656,634	..	....	1	1,094	..	...	484	1,657,728
1916.....	569	1,965,161	..	....	..	....	..	...	569	1,965,161
1917.....	579	1,984,233	..	....	..	....	..	...	579	1,984,233
1918.....	644	1,910,621	..	....	..	....	..	...	644	1,910,621
1919.....	702	2,041,638	..	....	..	....	..	...	702	2,041,638

PORT OF MONTREAL

Combined Statement showing the Number and Tonnage of all Vessels that arrived in Port during the past
Ten Years.

Year	TRANS-ATLANTIC			MARITIME PROVINCES			INLAND			GRAND TOTAL	
	Vessels	Tonnage	Vessels	Tonnage	Vessels	Tonnage	Vessels	Tonnage	Vessels	Tonnage	
1910.....	411	1,658,414	336	574,808	13,636	4,327,799	14,383	6,561,021			
1911.....	401	1,695,613	361	642,639	11,670	4,275,019	12,432	6,613,271			
1912.....	409	1,775,487	327	628,437	12,586	4,649,767	13,322	7,053,691			
1913.....	477	2,020,333	343	670,202	13,426	5,703,467	14,246	8,394,002			
1914.....	551	2,039,133	365	716,385	12,225	6,288,939	13,141	9,044,457			
1915.....	484	1,657,728	331	603,546	8,572	4,222,426	9,387	6,483,800			
1916.....	569	1,965,161	129	169,295	7,297	3,558,872	7,995	5,693,328			
1917.....	579	1,984,233	68	26,534	6,274	3,206,542	6,921	5,217,309			
1918.....	644	1,910,621	30	22,861	6,102	3,313,908	6,776	5,247,390			
1919.....	702	2,041,638	84	137,642	7,499	4,357,734	8,280	6,537,014			

1919

PORT OF MONTREAL

Statement showing Classification of Vessels that arrived in Port, for the past Ten Years, from the Lower St. Lawrence and Maritime Provinces.

Year	Steamships		Schooners		No.	Tonnage	Grand Total
	No.	Tonnage	No.	Tonnage			
1910.....	306	572,022	30	2,786	336	574,808	
1911.....	330	639,752	31	2,887	361	642,639	
1912.....	292	625,099	35	3,338	327	628,457	
1913.....	299	666,053	44	4,149	343	670,202	
1914.....	321	712,327	44	4,058	365	716,385	
1915.....	312	601,916	19	1,630	331	603,546	
1916.....	97	165,473	32	3,822	129	169,295	
1917.....	34	23,635	34	2,899	68	26,534	
1918.....	18	20,589	12	2,272	30	22,861	
1919.....	62	134,971	22	2,671	84	137,642	

1919

PORT OF MONTREAL

Statement showing the Dates of the Opening and Closing of Navigation, the First Arrival and the Last Departure for Sea; also the Greatest Number of Vessels in the Port at one time during the past ten years.

Year	Opening of Navigation	Closing of Navigation	First Arrival from Sea	Last Departure for Sea	Greatest number of Vessels in Port at one time.			
					No.	Date	Seagoing	Inland
1910	April 1st	Dec. 7th	April 11th	Dec. 1st	25	May 18th	122	Sept. 18th
1911	" 23rd	" 29th	" 28th	" 3rd	24	Aug. 18th	85	June 5th
1912	" 23rd	" 21st	" 30th	" 3rd	22	July 31st	86	Aug. 21st
1913	" 9th	" 27th	" 19th	Nov. 29th	29	Oct. 3rd	92	July 25th
1914	" 22nd	" 15th	" 29th	Dec. 4th	56	Aug. 21st	94	Aug. 17th
1915	" 11th	" 15th	" 30th	" 11th	34	Sept. 21st	66	July 26th
1916	" 22nd	" 18th	May 1st	" 6th	41	" 12th	62	" 25th
1917	" 19th	" 7th	" 1st	" 7th	37	Nov. 12th	52	Sept. 11th
1918	" 21st	" 17th	" 7th	" 14th	46	" 7th	50	Oct. 10th
1919	" 14th	" 12th	April 22nd	" 10th	35	June 12th	54	Aug. 24th

LIST OF HARBOUR COMMISSIONERS DREDGING PLANT, 1919

Description of Vessel	Hull.			When built	Engines.			Remarks			
	Length	Breadth	Depth		Kind of Engine	No. of cylinders	Dia. of cylinder	Length of stroke	Pressure of steam	Ibs.	c.y.
Dredges.											
Boom Spoon Dredge J. Kennedy	90	0	36	0	10	3	1892				
" " No. 4.....	90	0	36	0	10	9	1900	2	16	128	40
" " No. 5.....	104	0	36	0	10	9	1910	2	16	140	40
" " No. 6.....	104	0	39	0	10	9	1912	2	16	140	50
Elevator Dredge "Premier"	86	0	31	5	9	2	1905	2	14	15	
Derricks.											
Clam shell Derrick No. 1.....	76	0	27	6	8	0	1899	2	12	14	110
" " No. 2.....	80	0	30	0	7	6		2	10	12	120
" " No. 3.....	76	0	27	6	8	0	1900	2	12	14	110
" " No. 4.....	75	0	26	10	7	6	1892	2	12	14	110
" " No. 5.....	75	0	26	10	7	6	1892	2	12	14	110
" " No. 6.....	75	0	26	10	7	6	1892	2	12	14	110
" " No. 7.....	88	0	31	0	9	0	1913	2	12	14	140
" " No. 8.....	88	0	31	0	9	8	1915	2	12	14	140
Drilling & Blasting Boat	80	0	27	0	5	6	1895	.....	.....	.....	100
Drill Boat No. 1.....	60	0	20	0	5	0	1909	.....	.....	.....	80
Tug Boats.											
Tug "St. Peter"	74	8	16	1	8	6	1875	1	20	22	125
" " "Courier"	36	9	9	3	6	2	1900	1	10	12	125
" " "Aberdeen"	79	3	18	3	9	0	1895	{ 1	16	24	120
" " "Robert Mackay"	80	9	17	6	10	0	1899	{ 1	16	24	125

" No. 1.	90	0	26	0	6	0	Reblt.	Horizontal non-condensing	1	15	20	100
" "Sir Hugh Allan"....	130	0	26	6	15	0	1911	Vertical triple expansion	1	16	24	180
" "Hon. John Young"....	91	8	22	0	9	0	1911	condensing	1	25	18	140
" "Beaver".....	64	3	15	3	7	3	1892	Vertical compound	1	40	20	115
" "Passe-Partout"....	49	1	11	3	5	7	1912	condensing	1	12	9	10
" "David Seath"....	75	0	19	0	10	2	1915	Vertical high pressure	1	24	13	22
Testing boat.....	{73	3	14	0	3	1	1897	Vertical high pressure	1	18	26	22
Scows.								Vertical condensing	1	18		
2 Flat deck scows Nos. 2 & 4....								Vertical high pressure	1	20		
1 "	No. 10.	90	0	20	0	5	0	1876	0	6	67½ yds.	...
2 "	Nos. 21 & 22.	85	0	25	0	7	5	80	5	5	80	...
2 "	Nos. 23 & 24.	85	0	25	0	6	9	1891	5	150	150	...
5 "	Nos. 25-29....	85	0	25	0	6	9	1891	9	150	150	...
5 "	Nos. 31-35....	85	0	25	0	6	9	1892	9	150	150	...
2 "	Nos. 39 & 40.	85	0	25	0	7	6	1903	6	150	150	...
2 "	Nos. 41 & 42.	87	0	25	0	7	6	1904	6	150	150	...
12 "	Nos. 43-54....	100	0	30	0	9	9	1911-15	6	300	300	...
2 Dump scows, Nos. 36 & 37....	106	0	26	10	9	6	1899	6	200	200	200	...
1 "	No. 38	106	0	26	10	9	6	1900	6	200	200	...
2 "	(Gilbert's).....	60	0	20	0	6	0	0	5	100	100	400 tons
1 large coal scow.....	138	0	32	0	8	5	0	0	6	1915	1915	Reblt.
1 floating concrete machine.....	100	0	34	0	8	6	0	0	8	1896	1896	Converted floating grain elevator.
1 floating pile driver.....	50	9	24	2	5	8	0	0	8	1896	1896	Converted floating grain elevator.
1 floating air plant.....												

{ Iron sheathed with elm.
Formerly Floating Elevator, No. 1.

Steel hull, twin screws.

Steel hull, twin screws.

Wooden hull.

Wooden hull.

Wooden hull.

Two wooden scows braced 16 ft. apart.

